SAMSUNG

GSM TELEPHONE
SGH-X650

SERVICE Manual

GSM TELEPHONE

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1. Specification

1-1. GSM General Specification

	GSM900 Phase 1	**DCS1800 Phase 1**	**PC1900 Phase 1**
Freq. Band[MHz] Uplink/Downlink	890~915 935~960	1710~1785 1805~1880	1850~1910 1930~1990
ARFCN range	1~124	512~885	512~810
Tx/Rx spacing	45MHz	95MHz	80MHz
Mod. Bit rate/ Bit Period	270.833kbps 3.692us	270.833kbps 3.692us	270.833kbps 3.692us
Time Slot Period/Frame Period	576.9us 4.615ms	576.9us 4.615ms	576.9us 4.615ms
Modulation	0.3GMSK	0.3GMSK	0.3GMSK
MS Power	33dBm~5dBm	30dBm~0dBm	30dBm~0dBm
Power Class	5pcl ~ 19pcl	0pcl ~ 15pcl	0pcl ~ 15pcl
Sensitivity	-102dBm	-100dBm	-100dBm
TDMA Mux	8	8	8
Cell Radius	35Km	2Km	2Km

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1-2. GSM TX power class

TX Power control level	GSM900
5	33±2 dBm
6	31±2 dBm
7	29±2 dBm
8	27±2 dBm
9	25±2 dBm
10	23±2 dBm
11	21±2 dBm
12	19±2 dBm
13	17±2 dBm
14	15±2 dBm
15	13±2 dBm
16	11±3 dBm
17	9±3dBm
18	7±3 dBm
19	5±3 dBm

TX Power control level	DCS1800
0	30±3 dBm
1	28±3 dBm
2	26±3 dBm
3	24±3 dBm
4	22±3 dBm
5	20±3 dBm
6	18±3 dBm
7	16±3 dBm
8	14±3 dBm
9	12±4 dBm
10	10±4 dBm
11	8±4dBm
12	6±4 dBm
13	4±4 dBm
14	2±5 dBm
15	0±5 dBm

TX Power control level	PCS1900
0	30±3 dBm
1	28±3 dBm
2	26±3 dBm
3	24±3 dBm
4	22±3 dBm
5	20±3 dBm
6	18±3 dBm
7	16±3 dBm
8	14±3 dBm
9	12±4 dBm
10	10±4 dBm
11	8±4dBm
12	6±4 dBm
13	4±4 dBm
14	2±5 dBm
15	0±5 dBm

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2. Circuit Description

2-1. SGH-X650 RF Circuit Description

2-1-1. RX PART

- FEM(U201) → Switching Tx, Rx path for GSM900, DCS1800, PCS1900 by logic controlling.

- FEM Control Logic (U201) → Truth Table

	VC1	VC2	VC3
Tx Mode (GSM900)	H	L	L
Tx Mode (DCS1800/1900)	L	H	L
Rx Mode (GSM900)	L	L	L
Rx Mode (DCS1800)	L	L	L
Rx Mode (PCS1900)	L	L	H

- VC-TCXO (OSC101)

This module generates the 26MHz reference clock to drive the logic and RF. After division by two a reference clock of 13MHz is supplied to the other parts of the system through the pin CLKOUT. After additional process, the reference clock applies to the U100 Rx IQ demodulator and Tx IQ modulator. And then, the oscillator is controlled by serial data to select channel and use fast lock mode for GPRS high class operation.

- Transceiver (U100)

The receiver front-end which amplifies the GSM, DCS aerial signal, converts the chosen channel down to a low IF signal of 100 kHz. The first stages are symmetrical low noise amplifiers (LNAs). The LNAs are followed by an IQ down mixer. It consists of two mixers in parallel but driven by quadrature out of phase LO signals. The In phase (I) and Quadrature phase (Q) IF signals are low pass filtered to provide protection from high frequency offset interferes. The low IF I and Q signals are then fed into the channel filter. The front-end low IF I and Q outputs enter the integrated bandpass channel filter with provision for five 8 dB gain steps in front of the filter.

2-1-2. TX PART

I and Q baseband signals are applied to the IQ modulator that shifts the modulation spectrum up to the transmit IF. It is designed for low harmonic distortion, low carrier leakage and high image rejection to keep the phase error as small as possible.

The modulator is loaded at its IF output by an integrated low pass filter that suppress unwanted spurs prior to get into the phase detector. The clock drive is generated by division of the RFLO signal provided for the transmit offset mixer. Baseband IQ signal fed into offset PLL, this function is included inside of U101 chip. OSC100 chip generates modulator signal which power level is about 6.5dBm and fed into Power Amplifier(U200). The PA output power and power ramping are well controlled by Auto Power Control circuit. We use offset PLL below table.

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Modulation Spectrum	200kHz offset 30 kHz bandwidth	GSM	-35dBc
		DCS	-35dBc
	400kHz offset 30 kHz bandwidth	GSM	-66dBc
		DCS	-65dBc
	600kHz ~ 1.8MHz offset 30 kHz bandwidth	GSM	-75dBc
		DCS	-68dBc

2-2. Baseband Circuit description of SGH-X650

2-2-1. PCF50601

- Power Management

Ten low-dropout regulators designed specifically for GSM applications power the terminal and help ensure optimal system performance and long battery life. A programmable boost converter provides support for 1.8V, 3.0VSIMs, while a self-resetting, electronically fused switch supplies power to external accessories. Ancillary support functions, such as RTC module and High Voltage Charge pump, Clock generator, aid in reducing both board area and system complexity.
I2C BUS serial interface provides access to control and configuration registers. This interface gives a microprocessor full control of the PCF50601 and enables system designers to maximize both standby and talk times.
Supervisory functions. including a reset generator, an input voltage monitor, and a temperature sensor, support reliable system design. These functions work together to ensure proper system behavior during start-up or in the event of a fault condition(low microprocessor voltage, insufficient battery energy, or excessive die temperature).

-Backlight Brightness Modulator

The Backlight Brightness Modulator (BBM) contains a programmable Pulse-width modulator (PWM) and FET to modulate the intensity of a series of LED's or to control a DC/DC converter that drives LCD backlight.
This phone (SGH-X650) use PWM control to contrast the backlight brightness.

- Clock Generator

The Clock Generator (CG) generates all clocks for internal and external usage. The 32768 Hz crystal oscillator provides an accurate low clock frequency for the PCF50601 and other circuitry.

2-2-2. LCD Connector

LCD is consisted of main LCD(color 65K UFB LCD).
Chip select signals LCD_MAIN_CS can enable main LCD. BACKLIGHT signal enables white LED of main LCD.
"LCD_RESET" signal initiates the reset process of the LCD.
16-bit data lines(HD(0)~HD(15)) transfers data and commands to LCD. Data and commands use "HA(1)" signal. If this signal is low, inputs to LCD are commands. If it is high, inputs to LCD are data.

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The signal which informs the state of LCD is whether input or output, is required. But in this system, there is no input state from LCD. So only "HA(1)" signal is used to indicate write data or command to LCD. Power signals for LCD are "VBAT and "VDD2".

"SPK_P" and "SPK_N" are used for audio speaker containing voice or melody. And "VIB" from YMU762C enables the motor.

2-2-3. Key

This is consisted of key interface pins among OM6359, KBIO(0:7). These signals compose the matrix. Result of matrix informs the key status to key interface in the OM6359. Power on/off key is separated from the matrix. So power on/off signal is connected with PCF50601 to enable PCF50601. Seventeen key LEDs are use the "VDD_KEY" as supply voltage. "FLIP" informs the status of folder (open or closed) to the OM6359. This uses the hall effect IC, SH248CSP. A magnet under main LCD enables SH248CSP.

2-2-4. EMI ESD Filter

This system uses the EMI ESD filter, EMIF09 to protect noise from IF CONNECTOR part.

2-2-5. IF connetor

It is 18-pin connector. They are designed to use VBAT, V_EXT_CHARGE, TXD0, RXD0, RTS0, CTS0, JIG_REC, CHARGER_OK, RXD1, TXD1 and GND. They connected to power supply IC, microprocessor and signal processor IC.

2-2-6. Battery Charge Management

A complete constant-current/constant-voltage linear charger is used for single cell lithium-ion batteries. If TA connected to phone, "+DCVOLT" enable charger IC and supply current to battery.
When fault condition caused, "CHG_ON" signal level change low to high and charger IC stop charging process.

2-2-7. Audio

EARP_P and EARP_N from OM6359 are connected to the main speaker. MIC_P and MIC_N are connected to the main MIC. YMU762 is a synthesizer LSI for mobile phones. It is a LSI as an input/output device for sound sources, which is the mobile phones, such as AAC, in addition to ringing-melodies.

As a synthesis, YMU762 is equipped 32 voices with different tones. Since the device is capable of simultaneously generating up to synchronous with the play of the FM synthesizer, various sampled voices can be used as sound effects. Since the play data of YMU762 are interpreted at anytime through FIFO, the length of the data(playing period) is not limited, so the device can flexibly support application such as incoming call melody music distribution service.

The hardware sequencer built in this device allows playing of the complex music without giving excessive load to the CPU of the portable telephones.

For the purpose of enabling YMU762 to demonstrate its full capabilities, Yamaha purpose to use "SMAF:Synthetic music Mobile Application Format" as a data distribution format that is compatible with multimedia. Since the SMAF takes a structure that sets importance on the synchronization between sound and images, various contents can be written into it including incoming call melody with words that can be used for training karaoke, and commercial channel that combines texts, images and sounds, and others. The hardware sequencer of YMU788 directly interprets and plays blocks relevant to synthesis (playing music and reproducing ADPCM with FM synthesizer) that are included in data distributed in SMAF.

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2-2-8. Memory

Signals in the OM6359 enable memory. They use volt supply voltage, VDD3 in the PCF50601. This system uses Spansion's memory, S71WS128NC0BFWA70. It is consisted of 128M bits flash NOR memory and 64M bits SRAM. It has 16 bit data line, HD[0~15] which is connected to OM6359. It has 23 bit address lines, HA[1~23]. NCSFLASH & NCSRAM signals are chip select. Writing process, HWR_N is low and it enables writing process to flash memory and SRAM. During reading process, HRD_N is low and it enables reading process to flash memory and SRAM. Reading or writing procedure is processed after HWR_N or HRD_N is enabled.

2-2-9. OM6359

OM6359 is consisted of ARM core and DSP core. It has 8x1Kword on-chip program/data RAM, 55 Kwords on-chip program ROM in the DSP. It has 4K*32bits ROM and 2K*32bits RAM in the ARM core. DSP is consisted of KBS, JTAG, EMI and UART. ARM core is consisted of EMI, PIC(Programmable Interrupt Controller), reset/power/clock unit, DMA controller, TIC(Test Interface Controller), peripheral bridge, PPI, SSI(Synchronous Serial Interface), ACC(Asynchronous communications controllers), timer, ADC, RTC(Real-Time Clock) and keyboard interface. KBIO(0:7), address lines of DSP core and HD[0~15]. HA[1~26], address lines of ARM core and HD[0~15], data lines of ARM core are connected to memory and YMU762.

NCSRAM, NCSFLASH in the ARM core are connected to each memory. HWR_N and HRD_N control the process of memory. External IRQ(Interrupt ReQuest) signals from each units, such as, PMU need the compatible process. KBIO[0~7] receive the status from key and RXD0/TXD0 are used for the communication using data link cable(DEBUG_DTR/RTS/TXD/RXD/CTS/DSR).

It has JTAG control pins(TDI/TDO/TCK) for ARM core and DSP core. It receives 13MHz clock in CKI pin from external TCXO. ADC(Analog to Digital Convertor) part receives the status of temperature, battery type and battery voltage.

2-2-10. TOH2600DGI4KRA(26MHz)

This system uses the 26MHz TCXO, TOH2600DGI4KRA, SEM. AFC control signal from OM6359 controls frequency from 26MHz x-tal. The clock output frequency of UAA3536 is 13MHz. This clock is connected to OM6359, YMU762.

2-2-11. FM Radio(SI4700)

The SI4700 is a single chip electronically tuned FM radio for low voltage application with fully integrated IF selectivity and demodulation.

The radio is completely adjustment free and does only require a minimum of small and low cost external components. The radio can tune the European-, US- and Japan FM bands.

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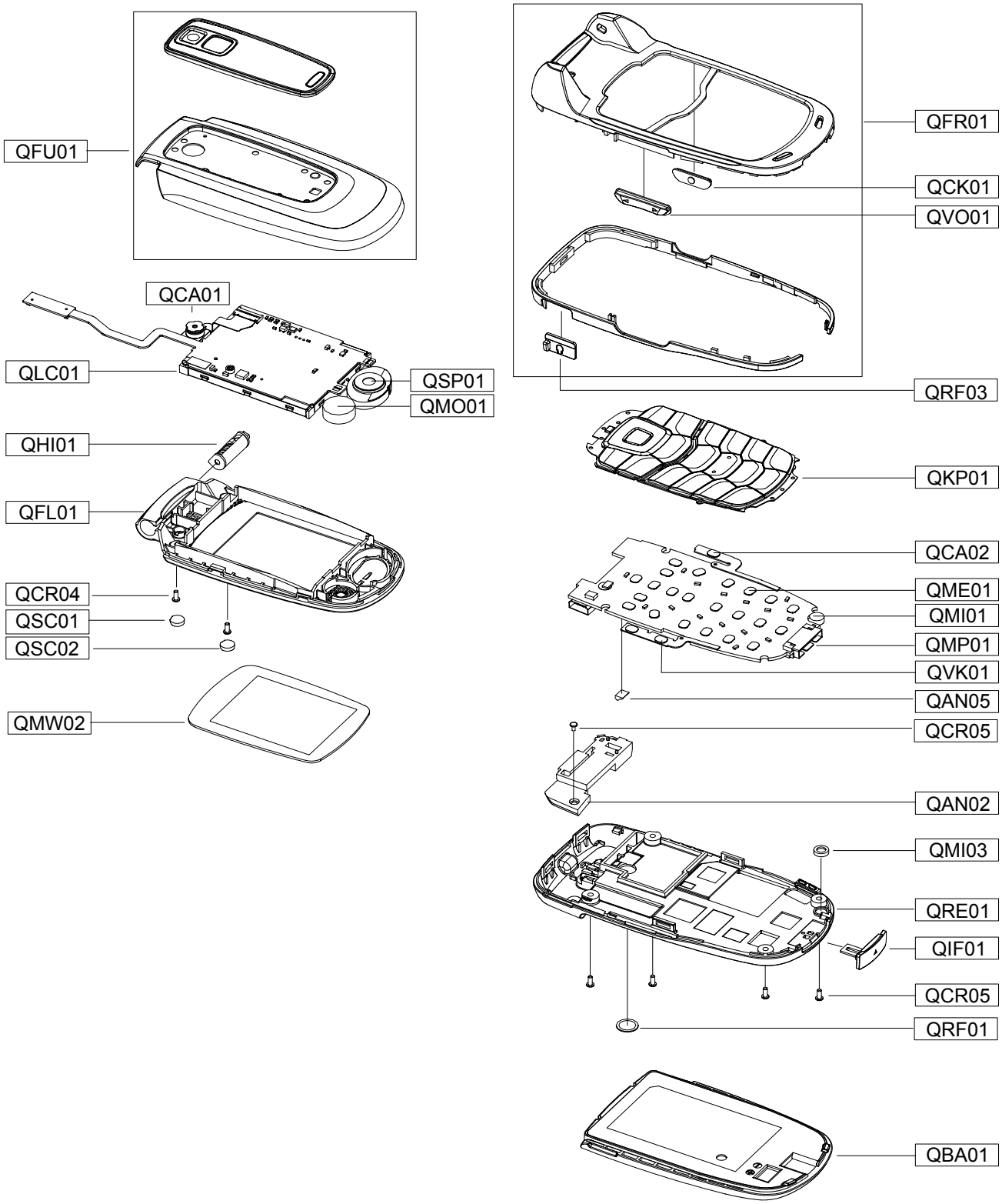
3. Exploded View and Parts List

3-1. Exploded View



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3-2. Parts List

Location No		Description	SEC CODE
QAN02		INTENNA-SGHX650	GH42-00787A
QAN05		MEC-ANT RUBBER	GH75-08511A
QBA01		BATTERY-800MAH,M/BLK,ENG,M	GH43-02348G
QCA01		UNIT-CAMERA	GH59-02886A
QCA02		UNIT-CAMERA KEY	GH59-02952A
QCR04		SCREW-MACHINE	6001-001479
QCR05		SCREW-MACHINE	6001-001478
QCR05		SCREW-MACHINE	6001-001478
QFU01		MEC-CASE FOLDER UPPER	GH75-09280A
QIF01		PMO-COVER IF	GH72-28083A
QKP01		ASSY-KEY-KEYPAD(EU/BLK)	GH98-01033A
QLC01		LCD-LCD MODULE	GH07-00864A
QME01		UNIT-METAL DOME	GH59-02953A
QMI01		MICROPHONE-ASSY-SGHX650	GH30-00257A
QMO01		MOTOR DC-SGHX670	GH31-00154E
QMP01		PBA MAIN-SGHX650S	GH92-02626A
QMW02		PCT-COVER MAIN WINDOW	GH72-29280A
QRF01		MPR-TAPE RF CAP	GH74-21182A
QRF03		PMO-COVER EAR	GH72-28082A
QSC01		ASSY-COVER-SCREW CAP	GH98-00708A
QSC02		ASSY-COVER-SCREW CAP R	GH98-00981A
QSP01		SPEAKER	3001-001935
QVK01		UNIT-VOLUME KEY	GH59-02951A
QRE01		MEC-CASE REAR	GH75-09282A
	QMI03	RMO-RUBBER MIC	GH73-06509A
QFL01		MEC-CASE FOLDER LOWER	GH75-09281A
	QHI01	MEC-HINGE ASSY	GH75-04334B
QFR01		MEC-CASE FRONT	GH75-09279A
	QCK01	PMO-CAMERA KEY	GH72-28086A
	QVO01	PMO-VOLUME KEY	GH72-28085A

3. Exploded View and Parts List

Description	SEC CODE
BAG PE	6902-000634
ADAPTOR-SGHD500 BLK	GH44-00955A
UNIT-EARPHONE(BLK)	GH59-02472A
SPRING ETC-BATT LOCKER	GH61-00120A
LABEL(P)-IMEI	GH68-01335D
LABEL(P)-WATER SOAK	GH68-02026A
LABEL(R)-MAIN(EU)	GH68-09320A
MANUAL USERS-SFC CARD(PHIL)	GH68-09366A
MANUAL USERS-SEA ENGLISH	GH68-09707A
CUSHION-CASE(EU)	GH69-03673A
BOX(P)-UNIT(INU)	GH69-03674D
RMO-CUSHION RUBBER CAMERA FPCB	GH73-07087A
RMO-CUSHION RUBBER BRAKET LCD	GH73-07088A
RMO-CUSHION RUBBER CON FPCB	GH73-07327A
MPR-BOHO VINYL LCD CONN	GH74-15350A
MPR-VINYL BOHO C/WIN S	GH74-19773A
MPR-CUSHION BOARD LIGHT	GH74-21170A
MPR-VINYL BOHO REAR	GH74-21179A
MPR-VINYL BOHO REAR	GH74-21179A
MPR-CUSHION FPCB HOLE	GH74-21180A
MPR-VINYL BOHO LCD WIN	GH74-21195A
MPR-TAPE HALL IC	GH74-23639A
MPR-TAPE DOME SHEET	GH74-23640A
MPR-TAPE LCD	GH74-24286A
MPR-TAPE VIBRATOR	GH74-24474A

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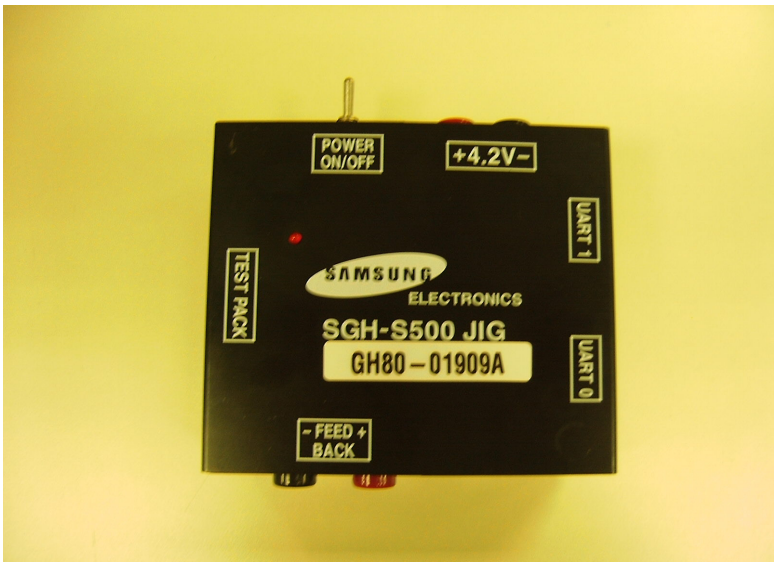
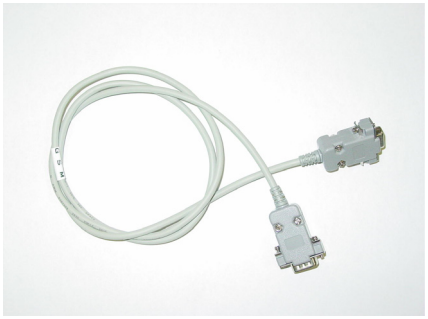
3-3. Test Jig (GH80-01909A)



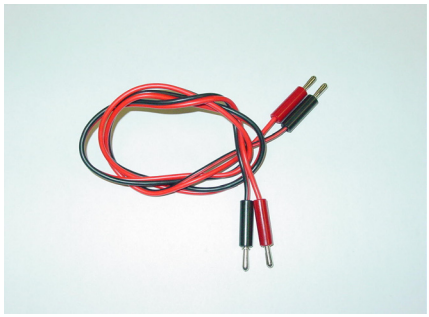
3-3-1. RF Test Cable (GH39-00283A)

3-3-2. Test Cable (GH39-00217A)

3-3-3. Serial Cable



3-3-4. Power Supply Cable



3-3-5. DATA CABLE (GH39-00219A)

3-3-6. TA (GH44-00184G)

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4. Electrical Parts List

Ddsign LOC	Discription	SEC Code	STATUS
ANT200	NPR-ANTENNA CONTACT	GH71-05744A	SA
ANT201	NPR-ANTENNA CONTACT	GH71-05744A	SA
BAT500	BATTERY-LI(2ND)	4302-001130	SA
BAT600	HEADER-BATTERY	3711-005897	SA
C100	C-CER,CHIP	2203-005482	SA
C103	C-CER,CHIP	2203-000233	SA
C104	C-CER,CHIP	2203-000233	SA
C105	C-CER,CHIP	2203-005138	SA
C106	C-CER,CHIP	2203-005482	SA
C109	C-CER,CHIP	2203-002525	SA
C110	C-CER,CHIP	2203-000838	SA
C111	C-CER,CHIP	2203-006961	SA
C112	C-CER,CHIP	2203-005482	SA
C113	C-CER,CHIP	2203-005057	SA
C114	C-CER,CHIP	2203-005057	SA
C115	C-CER,CHIP	2203-005482	SA
C116	C-CER,CHIP	2203-000254	SA
C117	C-CER,CHIP	2203-005481	SA
C118	C-CER,CHIP	2203-005480	SA
C119	C-CER,CHIP	2203-000233	SA
C120	C-CER,CHIP	2203-000233	SA
C121	C-CER,CHIP	2203-006562	SA
C122	C-CER,CHIP	2203-000438	SA
C123	C-CER,CHIP	2203-005482	SA
C124	C-CER,CHIP	2203-005057	SA
C125	C-CER,CHIP	2203-000233	SA
C126	C-CER,CHIP	2203-006562	SA
C128	C-CER,CHIP	2203-000585	SA
C129	C-CER,CHIP	2203-000233	SA
C130	C-CER,CHIP	2203-000609	SA
C132	C-CER,CHIP	2203-000679	SA
C134	C-CER,CHIP	2203-000679	SA
C135	C-CER,CHIP	2203-000585	SA
C136	C-CER,CHIP	2203-000585	SA
C137	C-CER,CHIP	2203-000585	SA
C138	C-CER,CHIP	2203-000585	SA
C201	C-CER,CHIP	2203-005482	SA
C202	C-CER,CHIP	2203-000311	SA
C203	C-CER,CHIP	2203-000585	SA
C204	C-TA,CHIP	2404-001411	SA
C205	C-CER,CHIP	2203-005482	SA
C206	C-CER,CHIP	2203-006190	SA
C207	C-CER,CHIP	2203-006190	SA
C208	C-CER,CHIP	2203-005234	SA
C209	C-CER,CHIP	2203-000812	SA
C210	C-CER,CHIP	2203-002668	SA
C212	C-CER,CHIP	2203-000233	SA
C213	C-CER,CHIP	2203-000233	SA
C214	C-CER,CHIP	2203-000278	SA
C219	C-CER,CHIP	2203-005382	SA

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C306	C-CER,CHIP	2203-005061	SA
C307	C-CER,CHIP	2203-000254	SA
C308	C-CER,CHIP	2203-000254	SA
C309	C-CER,CHIP	2203-005482	SA
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C311	C-CER,CHIP	2203-000854	SA
C312	C-CER,CHIP	2203-000254	SA
C313	C-CER,CHIP	2203-005482	SA
C314	C-CER,CHIP	2203-005482	SA
C315	C-CER,CHIP	2203-006562	SA
C316	C-CER,CHIP	2203-006562	SA
C317	C-CER,CHIP	2203-000679	SA
C400	C-CER,CHIP	2203-006562	SA
C401	C-CER,CHIP	2203-005061	SA
C403	C-CER,CHIP	2203-005061	SA
C404	C-CER,CHIP	2203-005061	SA
C405	C-CER,CHIP	2203-000643	SA
C407	C-CER,CHIP	2203-005482	SA
C409	C-CER,CHIP	2203-006562	SA
C410	C-CER,CHIP	2203-006562	SA
C411	C-CER,CHIP	2203-005061	SA
C500	C-CER,CHIP	2203-006208	SA
C501	C-CER,CHIP	2203-005482	SA
C502	C-CER,CHIP	2203-006208	SA
C503	C-CER,CHIP	2203-005482	SA
C504	C-CER,CHIP	2203-005482	SA
C505	C-CER,CHIP	2203-005482	SA
C506	C-CER,CHIP	2203-005571	SA
C507	C-CER,CHIP	2203-006257	SA
C508	C-CER,CHIP	2203-006208	SA
C509	C-CER,CHIP	2203-006208	SA
C510	C-CER,CHIP	2203-006208	SA
C511	C-CER,CHIP	2203-005395	SA
C512	C-CER,CHIP	2203-000386	SA
C513	C-TA,CHIP	2404-001225	SA
C514	C-CER,CHIP	2203-005482	SA
C515	C-CER,CHIP	2203-000627	SNA
C516	C-CER,CHIP	2203-006257	SA
C517	C-CER,CHIP	2203-006348	SA
C518	C-CER,CHIP	2203-000627	SNA
C519	C-CER,CHIP	2203-006208	SA
C520	C-CER,CHIP	2203-000885	SA
C521	C-CER,CHIP	2203-006208	SA
C522	C-CER,CHIP	2203-006208	SA

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C526	C-TA,CHIP	2404-001225	SA
C527	C-CER,CHIP	2203-005482	SA
C528	C-CER,CHIP	2203-005482	SA
C529	C-CER,CHIP	2203-005482	SA
C530	C-CER,CHIP	2203-006208	SA
C531	C-CER,CHIP	2203-005061	SA
C532	C-CER,CHIP	2203-002443	SA
C533	C-CER,CHIP	2203-006562	SA
C535	C-CER,CHIP	2203-006257	SA
C536	C-CER,CHIP	2203-006208	SA
C537	C-CER,CHIP	2203-000679	SA
C538	C-CER,CHIP	2203-006348	SA
C539	C-CER,CHIP	2203-006208	SA
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C543	C-CER,CHIP	2203-005482	SA
C544	C-TA,CHIP	2404-001394	SA
C545	C-CER,CHIP	2203-006562	SA
C546	C-CER,CHIP	2203-006562	SA
C601	C-CER,CHIP	2203-005061	SA
C602	C-CER,CHIP	2203-000854	SA
C603	C-CER,CHIP	2203-005061	SA
C605	C-TA,CHIP	2404-001402	SA
C606	C-CER,CHIP	2203-005061	SA
C607	C-CER,CHIP	2203-000679	SA
C608	C-CER,CHIP	2203-005061	SA
C610	C-CER,CHIP	2203-000386	SA
C612	C-CER,CHIP	2203-000812	SA
C613	C-CER,CHIP	2203-005061	SA
C615	C-CER,CHIP	2203-000679	SA
C616	C-CER,CHIP	2203-000643	SA
C618	C-CER,CHIP	2203-005482	SA
C619	C-CER,CHIP	2203-000425	SA
C622	C-CER,CHIP	2203-000425	SA
C624	C-CER,CHIP	2203-000386	SA
C625	C-CER,CHIP	2203-000386	SA
C626	C-CER,CHIP	2203-000386	SA
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C702	C-CER,CHIP	2203-005482	SA
C703	C-CER,CHIP	2203-005482	SA
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C705	C-CER,CHIP	2203-005683	SA
C706	C-CER,CHIP	2203-005683	SA
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C708	C-CER,CHIP	2203-005683	SA
C709	C-CER,CHIP	2203-005683	SA
C710	C-CER,CHIP	2203-005683	SA

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Ddsign LOC	Discription	SEC Code	STATUS
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C714	C-CER,CHIP	2203-005683	SA
C715	C-CER,CHIP	2203-005683	SA
C716	C-CER,CHIP	2203-005683	SA
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C718	C-CER,CHIP	2203-000812	SA
C719	C-CER,CHIP	2203-000812	SA
C800	C-CER,CHIP	2203-006562	SA
C802	C-CER,CHIP	2203-000679	SA
C803	C-CER,CHIP	2203-005482	SA
C804	C-CER,CHIP	2203-005482	SA
C805	C-CER,CHIP	2203-005482	SA
C806	C-CER,CHIP	2203-000438	SA
C807	C-CER,CHIP	2203-000725	SA
C808	C-CER,CHIP	2203-000812	SA
C809	C-CER,CHIP	2203-000812	SA
C810	C-CER,CHIP	2203-005482	SA
C811	C-TA,CHIP	2404-001394	SA
C812	C-CER,CHIP	2203-005482	SA
C813	C-CER,CHIP	2203-002443	SA
C815	C-TA,CHIP	2404-001240	SA
C816	C-CER,CHIP	2203-005482	SA
C817	C-CER,CHIP	2203-006260	SA
C818	C-CER,CHIP	2203-000233	SA
C819	C-CER,CHIP	2203-006257	SA
C820	C-CER,CHIP	2203-006260	SA
C822	C-CER,CHIP	2203-006260	SA
C823	C-CER,CHIP	2203-006257	SA
C824	C-CER,CHIP	2203-006260	SA
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C833	C-CER,CHIP	2203-000254	SA
C834	C-CER,CHIP	2203-000254	SA
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CN201	CONNECTOR-COAXIAL	3705-001358	SA
CN500	CONNECTOR-CARD EDGE	3709-001229	SA
CN600	CONNECTOR-INTERFACE	3710-001994	SA
CN601	JACK-PHONE	3722-002082	SA
D400	DIODE-TVS	0406-001231	SA
D600	DIODE-TVS	0406-001231	SA
D601	DIODE-TVS	0406-001231	SA
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D608	DIODE-TVS	0406-001231	SA
D609	DIODE-TVS	0406-001231	SA
D610	DIODE-TVS	0406-001231	SA
F201	FILTER-EMI SMD	2901-001254	SA
F700	FILTER-EMI SMD	2901-001286	SA
F701	FILTER-EMI SMD	2901-001286	SA
F702	FILTER-EMI SMD	2901-001286	SA
F703	FILTER-EMI SMD	2901-001286	SA
F704	FILTER-EMI SMD	2901-001286	SA
HDC700	HEADER-BOARD TO BOARD	3711-005918	SA
L100	INDUCTOR-SMD	2703-002201	SA
L101	INDUCTOR-SMD	2703-002176	SA
L103	INDUCTOR-SMD	2703-002176	SA
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L108	INDUCTOR-SMD	2703-002208	SA
L208	INDUCTOR-SMD	2703-002313	SA
L210	R-CHIP	2007-000171	SA
L212	INDUCTOR-SMD	2703-001723	SA
L213	INDUCTOR-SMD	2703-002369	SA
L216	INDUCTOR-SMD	2703-002170	SA
L500	BEAD-SMD	3301-001105	SA
L501	BEAD-SMD	3301-001729	SA
L600	INDUCTOR-SMD	2703-001513	SA
L601	BEAD-SMD	3301-001729	SA
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L603	BEAD-SMD	3301-001729	SA
L604	BEAD-SMD	3301-001729	SA
L605	BEAD-SMD	3301-001729	SA
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LED613	LED	0601-002037	SA
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LED615	LED	0601-002037	SA
LED616	LED	0601-002037	SA
OSC100	OSCILLATOR-VCO	2806-001329	SA

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OSC101	OSCILLATOR-VCTCXO	2809-001281	SA
Q200	TR-DIGITAL	0504-001151	SA
Q400	FET-SILICON	0505-002088	SA
R100	R-CHIP	2007-007148	SA
R101	R-CHIP	2007-000141	SA
R102	R-CHIP	2007-000171	SA
R103	R-CHIP	2007-007311	SA
R104	R-CHIP	2007-000566	SA
R105	R-CHIP	2007-000174	SA
R106	R-CHIP	2007-000148	SA
R107	R-CHIP	2007-000566	SA
R108	R-CHIP	2007-001305	SA
R109	R-CHIP	2007-003030	SA
R110	R-CHIP	2007-000982	SA
R111	R-CHIP	2007-000138	SA
R112	R-CHIP	2007-000138	SA
R113	R-CHIP	2007-000982	SA
R114	R-CHIP	2007-000982	SA
R115	R-CHIP	2007-000982	SA
R201	R-CHIP	2007-000171	SA
R202	R-CHIP	2007-000145	SA
R204	R-CHIP	2007-000171	SA
R205	R-CHIP	2007-000171	SA
R206	R-CHIP	2007-000171	SA
R207	R-CHIP	2007-000162	SA
R208	R-CHIP	2007-000162	SA
R209	R-CHIP	2007-000162	SA
R210	R-CHIP	2007-000171	SA
R211	R-CHIP	2007-000171	SA
R212	R-CHIP	2007-000171	SA
R300	R-CHIP	2007-000174	SA
R301	R-CHIP	2007-000148	SA
R302	R-CHIP	2007-000162	SA
R303	R-CHIP	2007-007107	SA
R304	R-CHIP	2007-000159	SA
R305	R-CHIP	2007-007142	SA
R306	R-CHIP	2007-007107	SA
R307	R-CHIP	2007-000162	SA
R308	R-CHIP	2007-000162	SA
R309	R-CHIP	2007-007001	SA
R310	R-CHIP	2007-000141	SA
R311	R-CHIP	2007-000141	SA
R321	R-CHIP	2007-000143	SA
R322	R-CHIP	2007-000171	SA
R323	R-CHIP	2007-000162	SA
R400	R-CHIP	2007-000162	SA
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R403	R-CHIP	2007-000162	SA
R404	R-CHIP	2007-000162	SA
R405	R-CHIP	2007-000162	SA

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Ddsign LOC	Discription	SEC Code	STATUS
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R407	R-CHIP	2007-000162	SA
R408	R-CHIP	2007-000162	SA
R409	R-CHIP	2007-000171	SA
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R411	R-CHIP	2007-000171	SA
R412	R-CHIP	2007-000171	SA
R413	R-CHIP	2007-000171	SA
R500	R-CHIP	2007-000148	SA
R502	R-CHIP	2007-000162	SA
R503	R-CHIP	2007-007573	SA
R504	R-CHIP	2007-007334	SA
R505	R-CHIP	2007-000151	SA
R506	R-CHIP	2007-007100	SA
R507	R-CHIP	2007-000162	SA
R508	R-CHIP	2007-000157	SA
R510	R-CHIP	2007-007489	SA
R511	R-CHIP	2007-007311	SA
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R605	R-CHIP	2007-000148	SA
R606	R-CHIP	2007-000171	SA
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R610	R-CHIP	2007-008531	SA
R611	R-CHIP	2007-002796	SA
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R616	R-CHIP	2007-000140	SA
R617	R-CHIP	2007-000148	SA
R619	R-CHIP	2007-007009	SA
R620	R-CHIP	2007-007009	SA
R621	R-CHIP	2007-007009	SA
R622	R-CHIP	2007-007009	SA
R623	R-CHIP	2007-003030	SA
R624	R-CHIP	2007-003030	SA
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R627	R-CHIP	2007-003030	SA
R628	R-CHIP	2007-003030	SA
R629	R-CHIP	2007-003030	SA

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Ddsign LOC	Discription	SEC Code	STATUS
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R633	R-CHIP	2007-000171	SA
R634	R-CHIP	2007-000171	SA
R637	R-CHIP	2007-007107	SA
R638	R-CHIP	2007-001339	SA
R639	R-CHIP	2007-001317	SA
R640	R-CHIP	2007-007107	SA
R641	R-CHIP	2007-003030	SA
R642	R-CHIP	2007-003030	SA
R643	R-CHIP	2007-002970	SA
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R647	R-CHIP	2007-000138	SA
R648	R-CHIP	2007-000138	SA
R700	R-CHIP	2007-007317	SA
R703	R-CHIP	2007-007317	SA
R803	R-CHIP	2007-001325	SA
R804	R-CHIP	2007-007588	SA
R805	R-CHIP	2007-007308	SA
R808	R-CHIP	2007-000171	SA
R809	R-CHIP	2007-000171	SA
R812	R-CHIP	2007-000171	SA
R813	R-CHIP	2007-000171	SA
R814	R-CHIP	2007-007014	SA
R815	R-CHIP	2007-007014	SA
R816	R-CHIP	2007-000171	SA
R818	R-CHIP	2007-000162	SA
R819	R-CHIP	2007-000162	SA
R821	R-CHIP	2007-000171	SA
R822	R-CHIP	2007-007014	SA
R823	R-CHIP	2007-007014	SA
R824	R-CHIP	2007-000172	SA
R825	R-CHIP	2007-000172	SA
R826	R-CHIP	2007-001303	SA
SW500	IC-HALL EFFECT S/W	1009-001018	SA
TH300	THERMISTOR-NTC	1404-001221	SA
U100	IC-TRANSCEIVER	1205-002327	SA
U200	IC-POWER AMP	1201-002218	SA
U201	DUPLEXER-FEM	2911-000032	SA
U300	IC-COMM. CONTROLLER	1205-002607	SA
U400	IC-MCP	1108-000059	SA
U401	IC ASIC-SGHX670	GH13-00036A	SA
U402	FET-SILICON	0505-001923	SA
U500	IC-CONTROLLER	1205-002350	SA
U503	IC-POSI.FIXED REG.	1203-003787	SA
U504	PHOTO-IRDA	0604-001306	SA
U505	IC-BATTERY	1203-003663	SA

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Ddsign LOC	Discription	SEC Code	STATUS
U600	IC-VOLTAGE COMP.	1202-001068	SA
U601	IC-ANALOG SWITCH	1001-001359	SA
U603	FILTER-EMI/ESD	2901-001246	SA
U605	TR-DIGITAL	0504-001100	SA
U800	IC-MELODY	1204-002161	SA
U801	IC-CMOS LOGIC	0801-003025	SA
U802	IC-TUNER	1204-002510	SA
U803	IC-AUDIO AMP	1201-002356	SA
U804	IC-CMOS LOGIC	0801-003099	SA
U805	FET-SILICON	0505-001923	SA
U808	C-CER,CHIP	2203-000233	SA
V700	VARISTOR	1405-001082	SA
V701	VARISTOR	1405-001082	SA
V702	VARISTOR	1405-001082	SA
V703	DIODE-TVS	0406-001231	SA
V704	DIODE-TVS	0406-001231	SA
V705	VARISTOR	1405-001082	SA
V706	VARISTOR	1405-001082	SA
V707	DIODE-TVS	0406-001231	SA
V708	VARISTOR	1405-001082	SA
X500	CRYSTAL-SMD	2801-004373	SA
ZD600	DIODE-TVS	0406-001231	SA
ZD601	DIODE-TVS	0406-001231	SA
ZD602	DIODE-TVS	0406-001197	SA
ZD603	DIODE-ZENER	0403-001547	SA
ZD604	DIODE-TVS	0406-001150	SA

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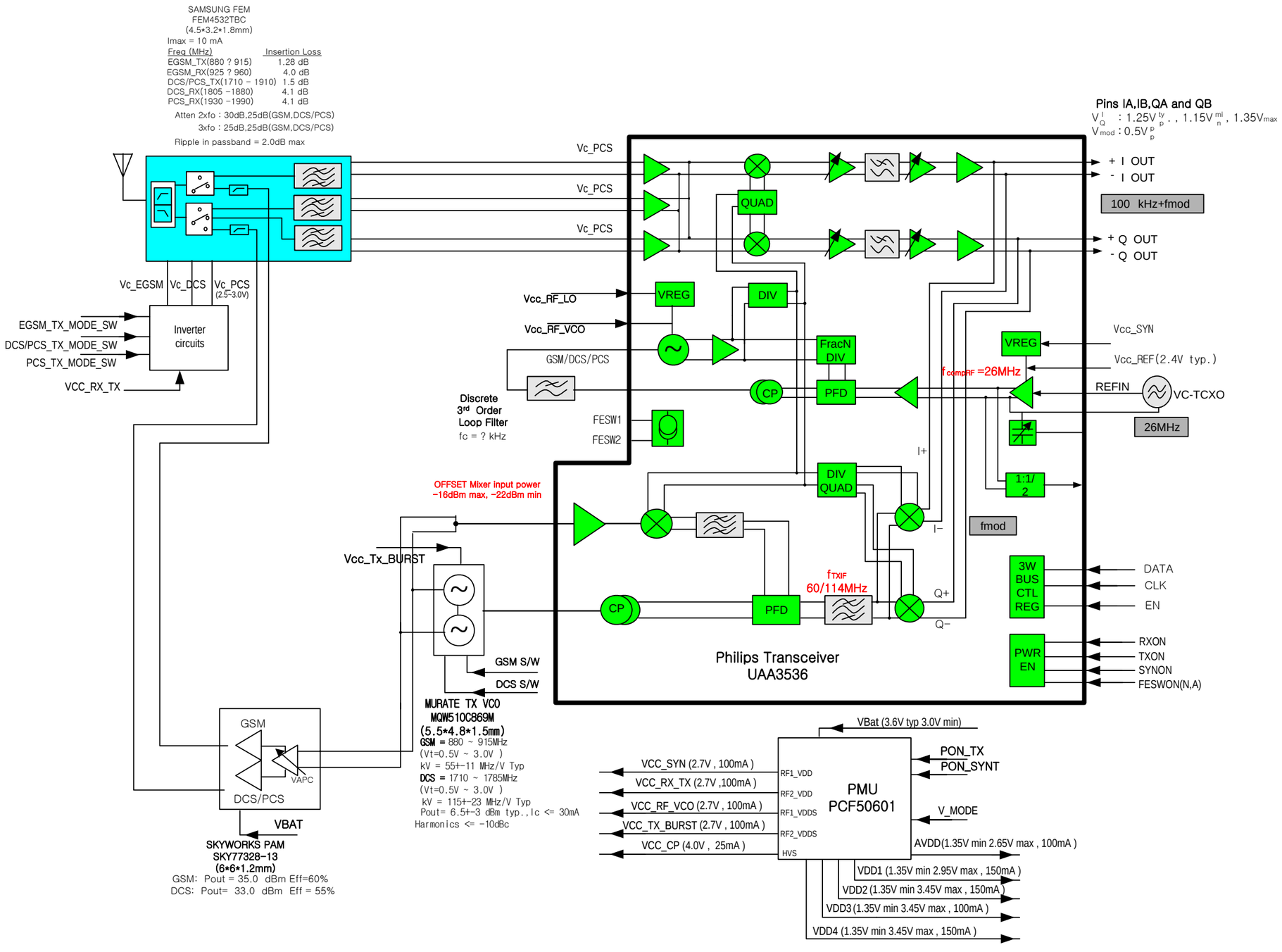
5. Block Diagrams

5-1. RF Solution Block Diagram



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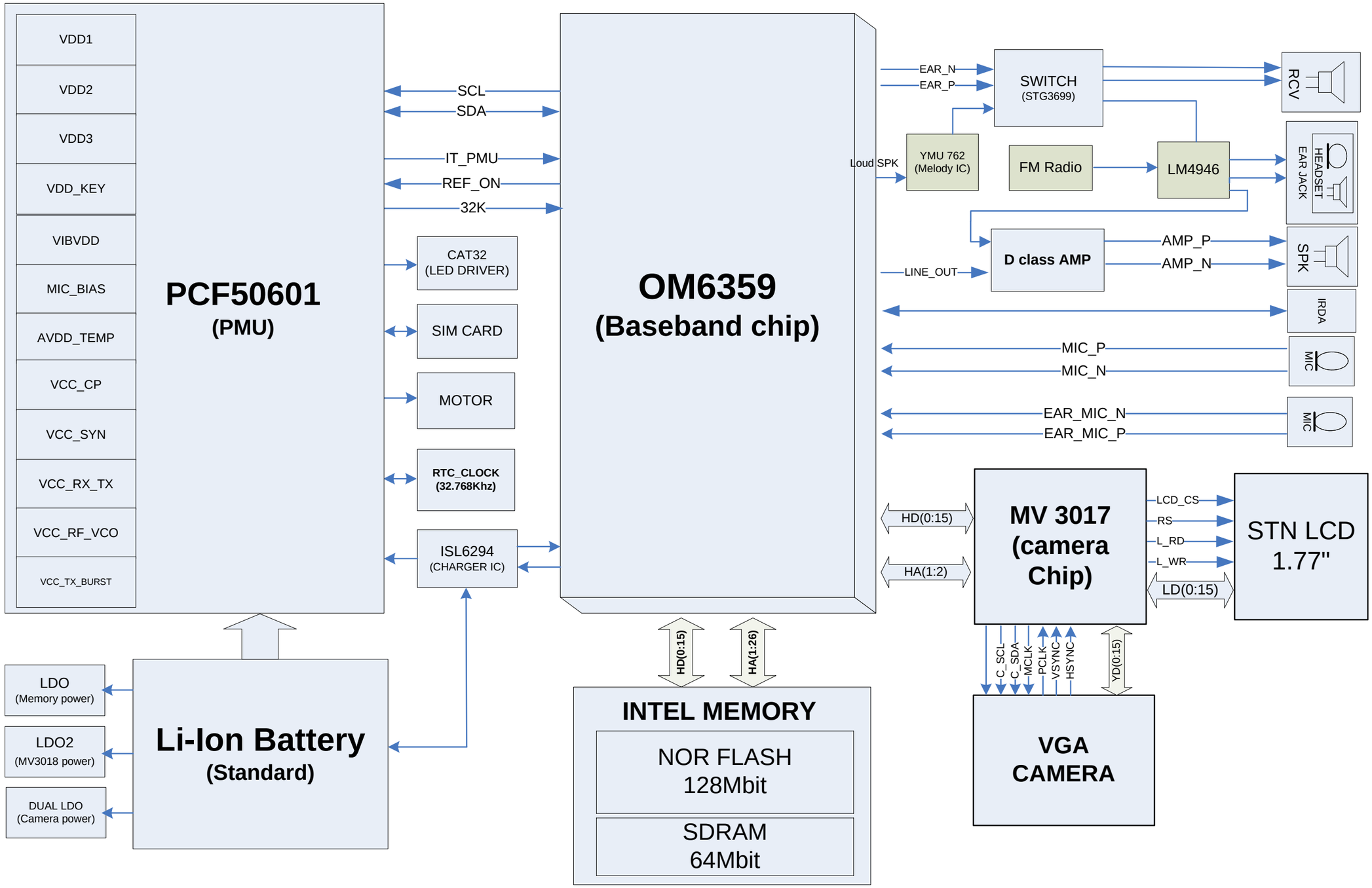
5-2. Base Band Solution Block Diagram



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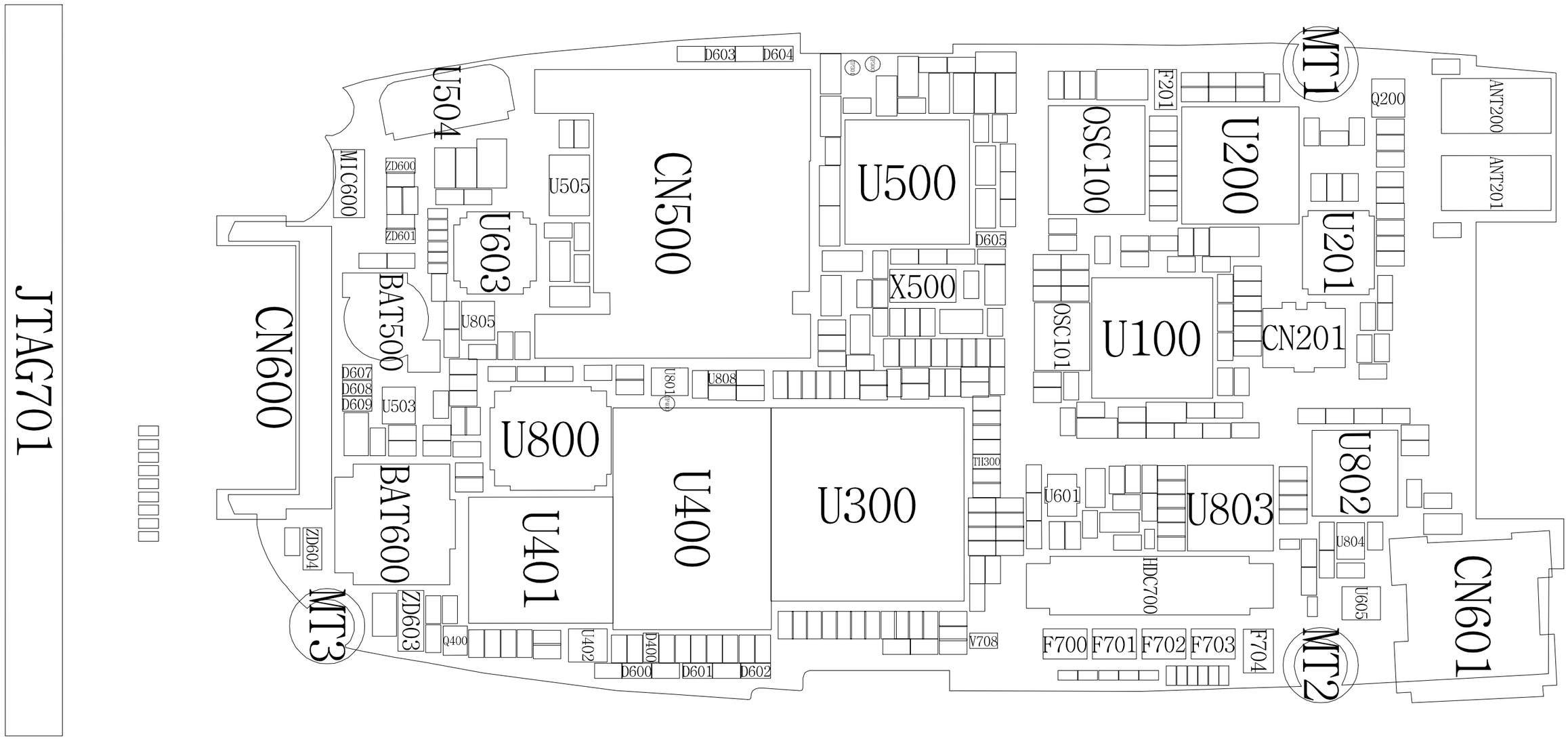
6. PCB Diagrams

6-1. PCB Top Diagram



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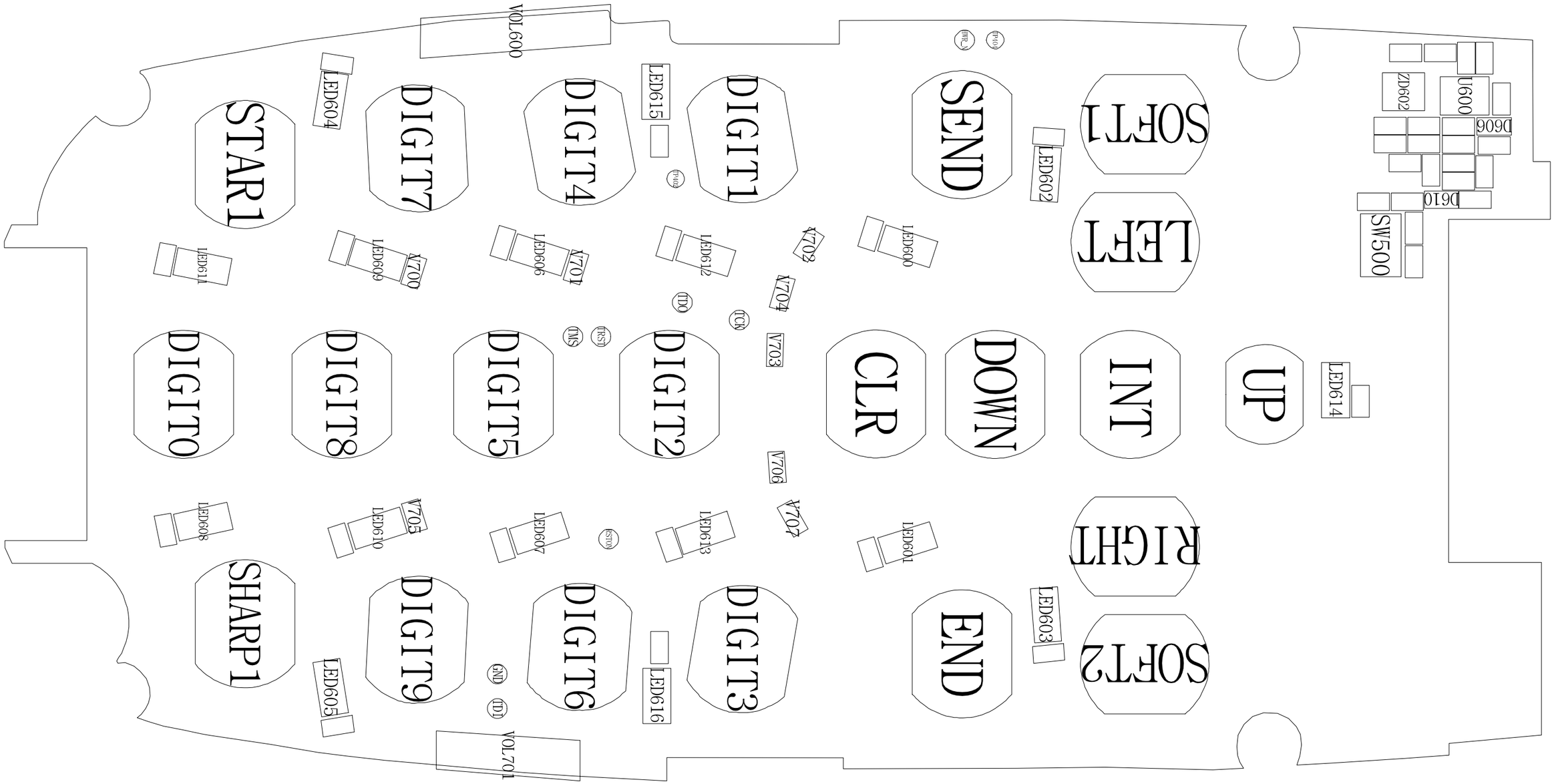
6-2. PCB Bottom Diagram



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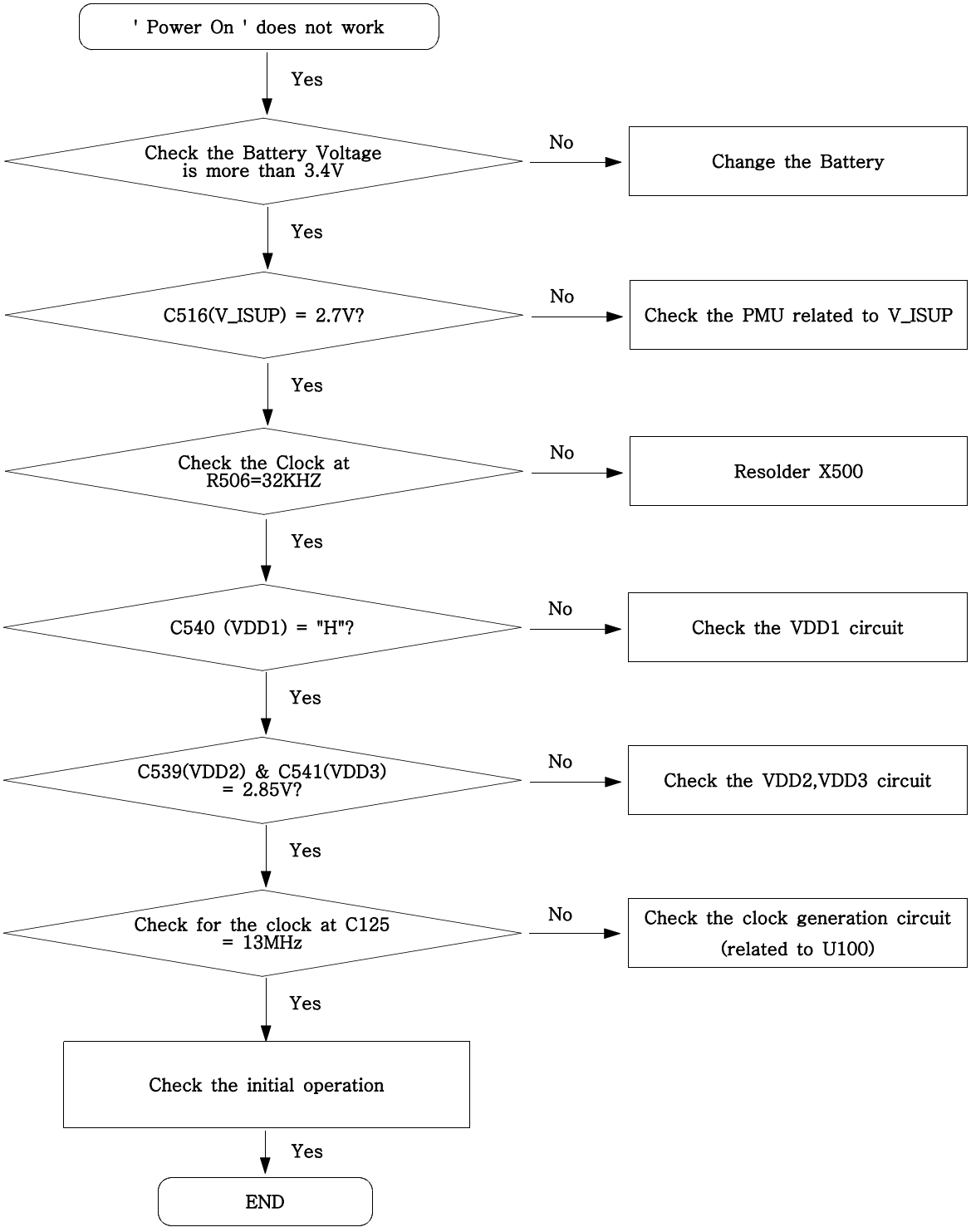
7. Flow Chart of Troubleshooting

7-1. Power On



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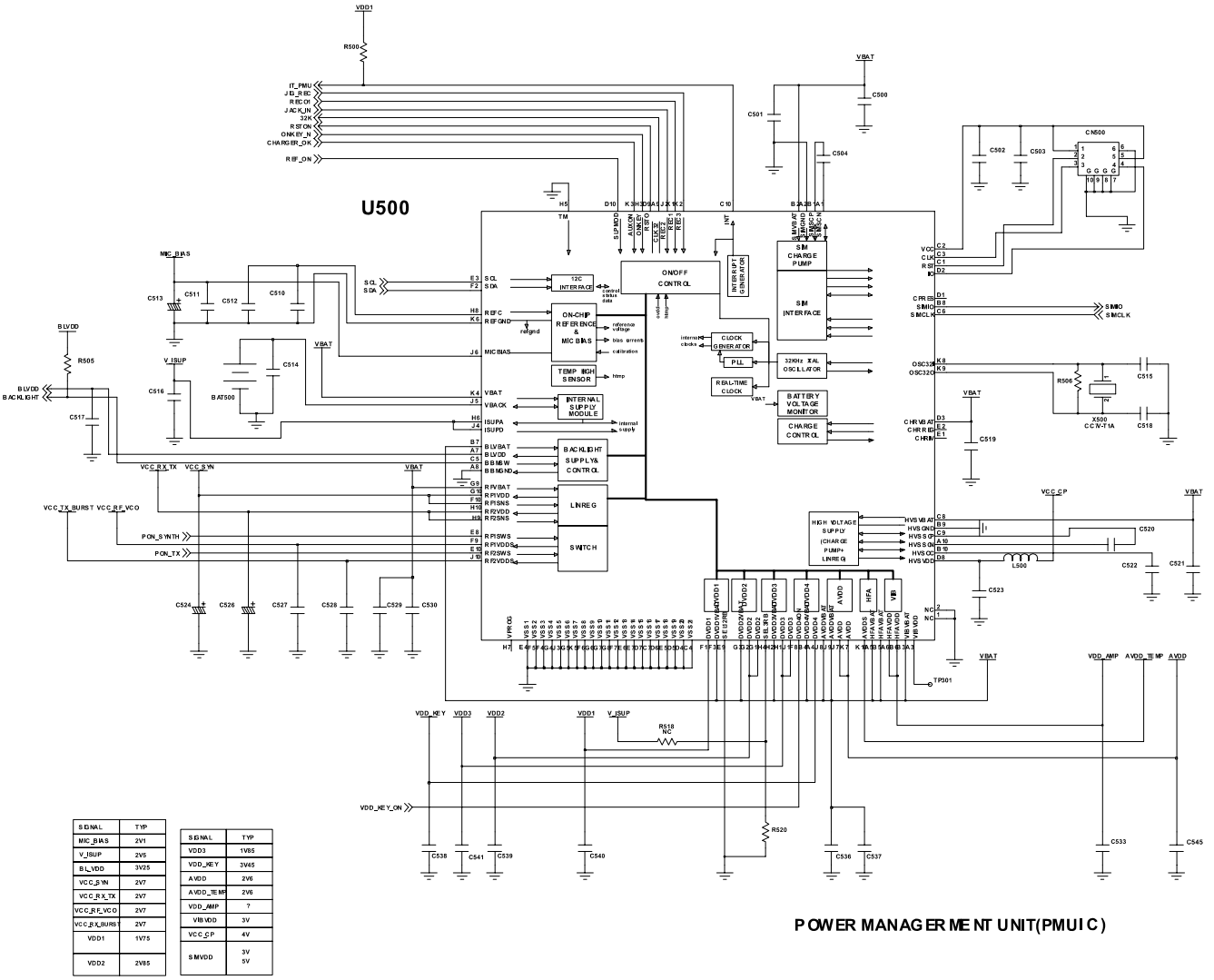
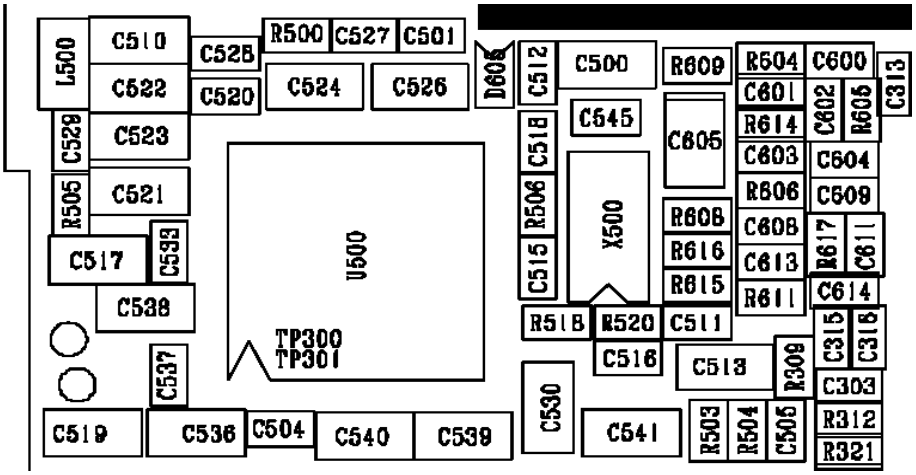
Power On



SIGNAL	TYP
MIC_BIAS	2V1
V_ISUP	2V5
B1_VDD	3V25
VCC_SYN	2V7
VCC_RX_TX	2V7
VCC_RF_VCO	2V7
VCC_PA_BURST	2V7
VDD1	1V75
VDD2	2V85

SIGNAL	TYP
VDD3	1V85
VDD_KEY	3V45
AVDD	2V6
AVDD_TEMP	2V6
VDD_AMP	?
VIBVDD	3V
VCC_CP	4V
SIMVDD	3V 5V



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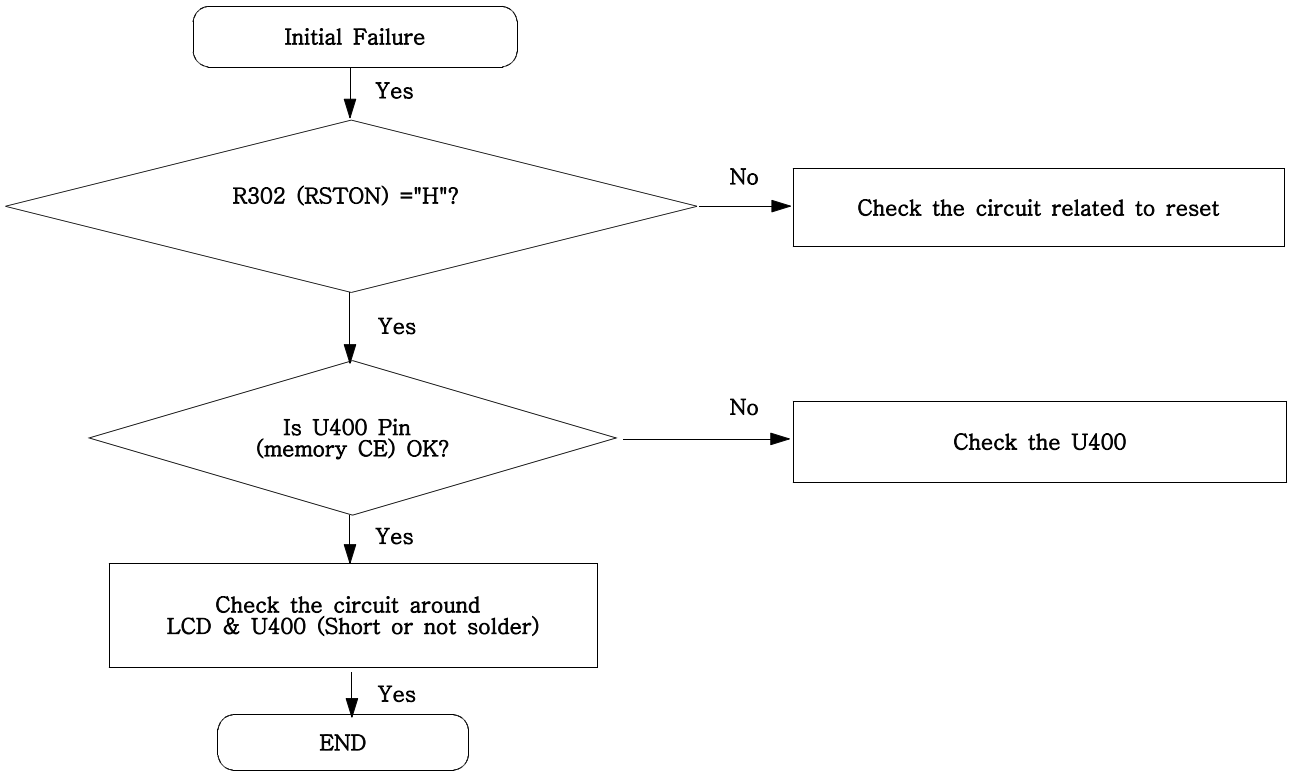
7-2. Initial



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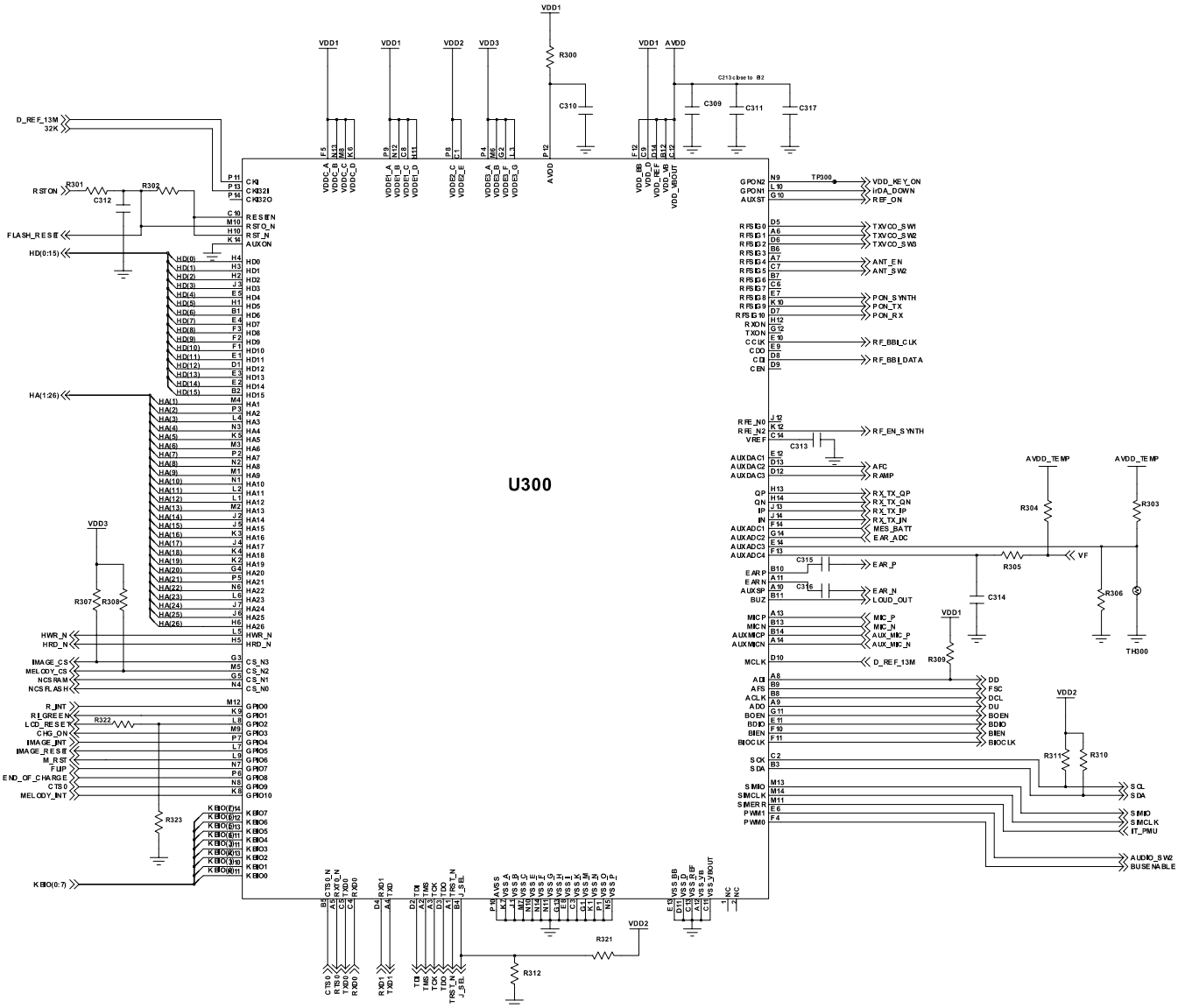
Initial



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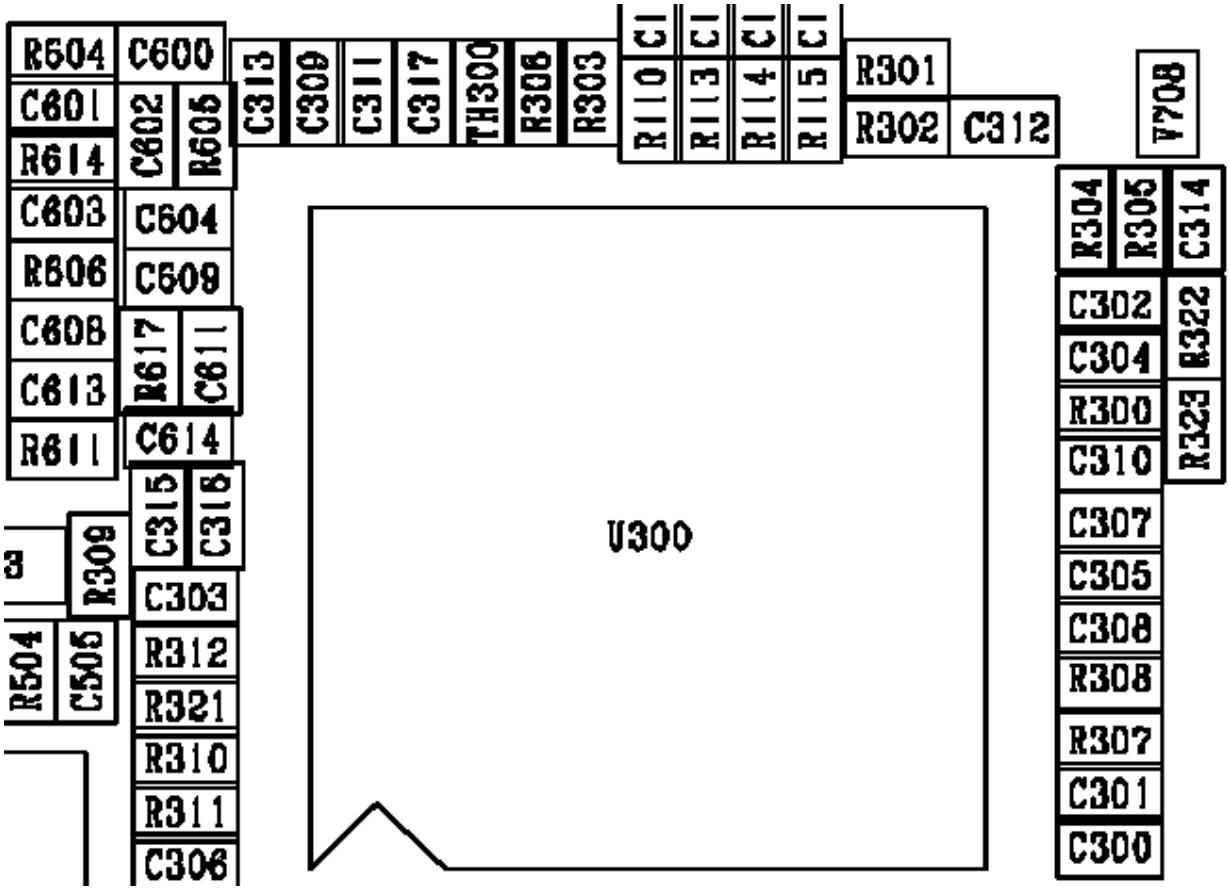

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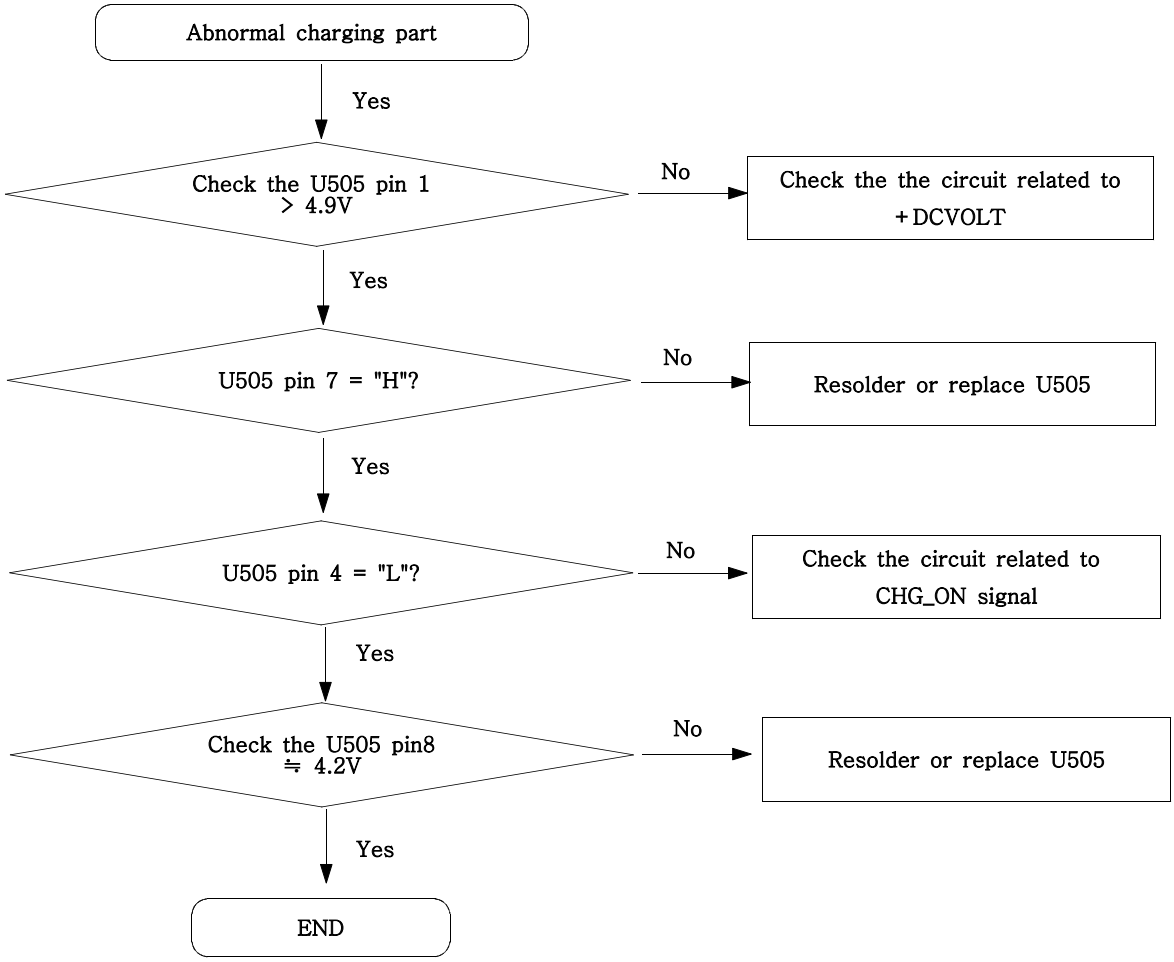
7-3. Charging Part



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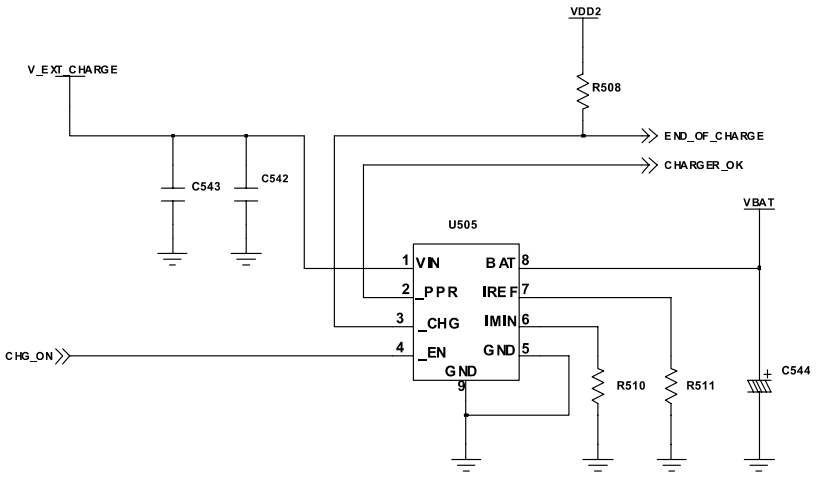
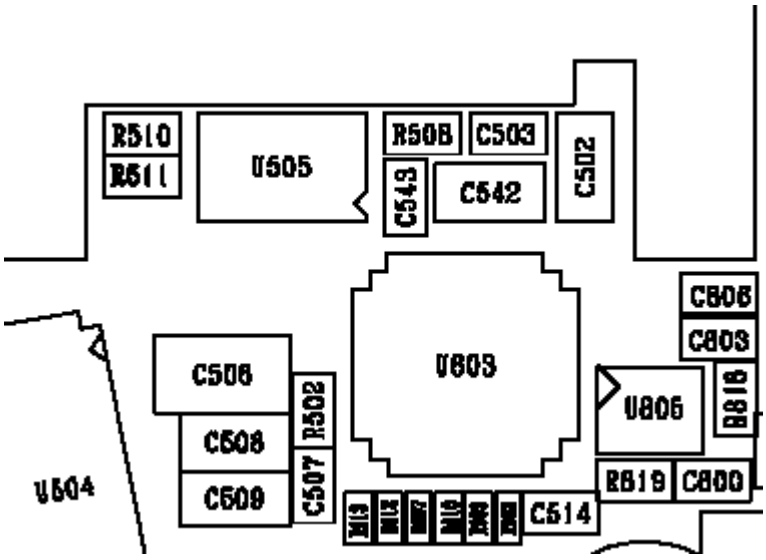
Charging



CHARGER IC



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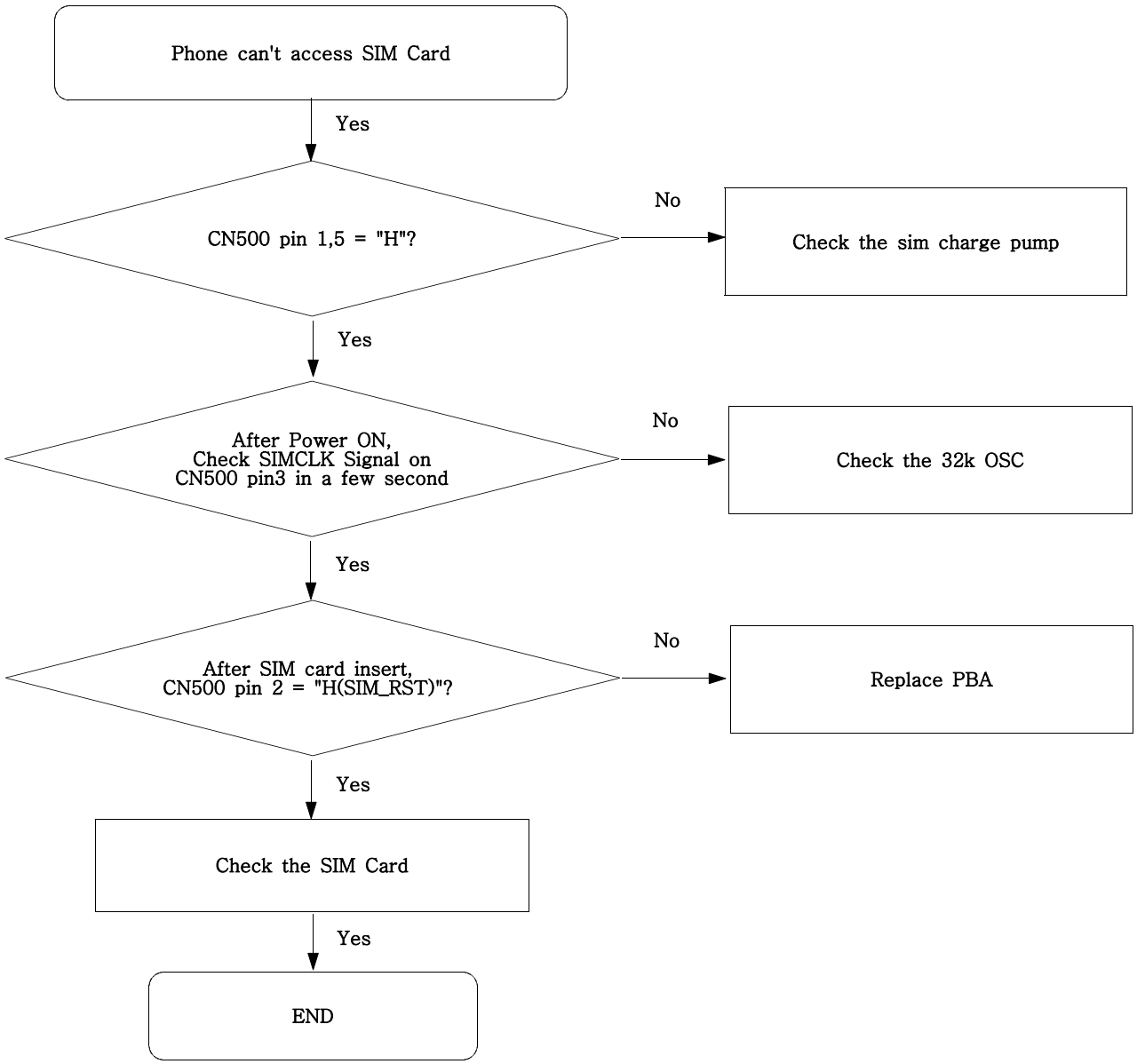
7-4. Sim Part



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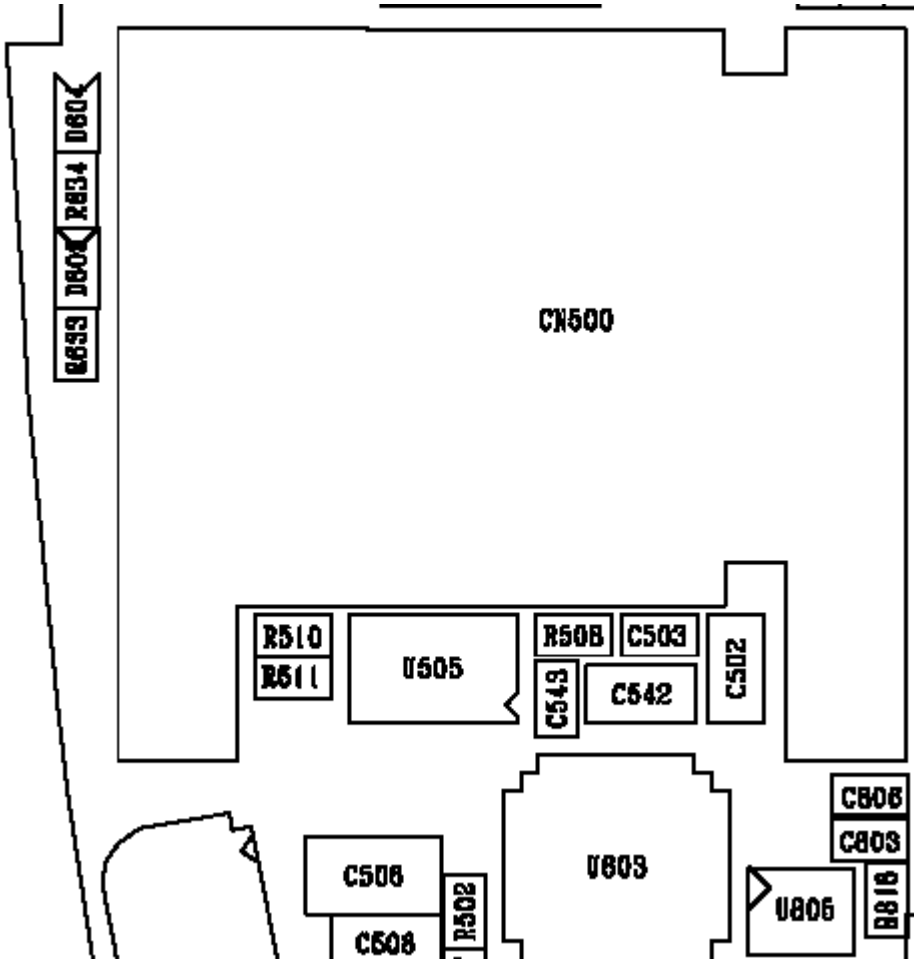

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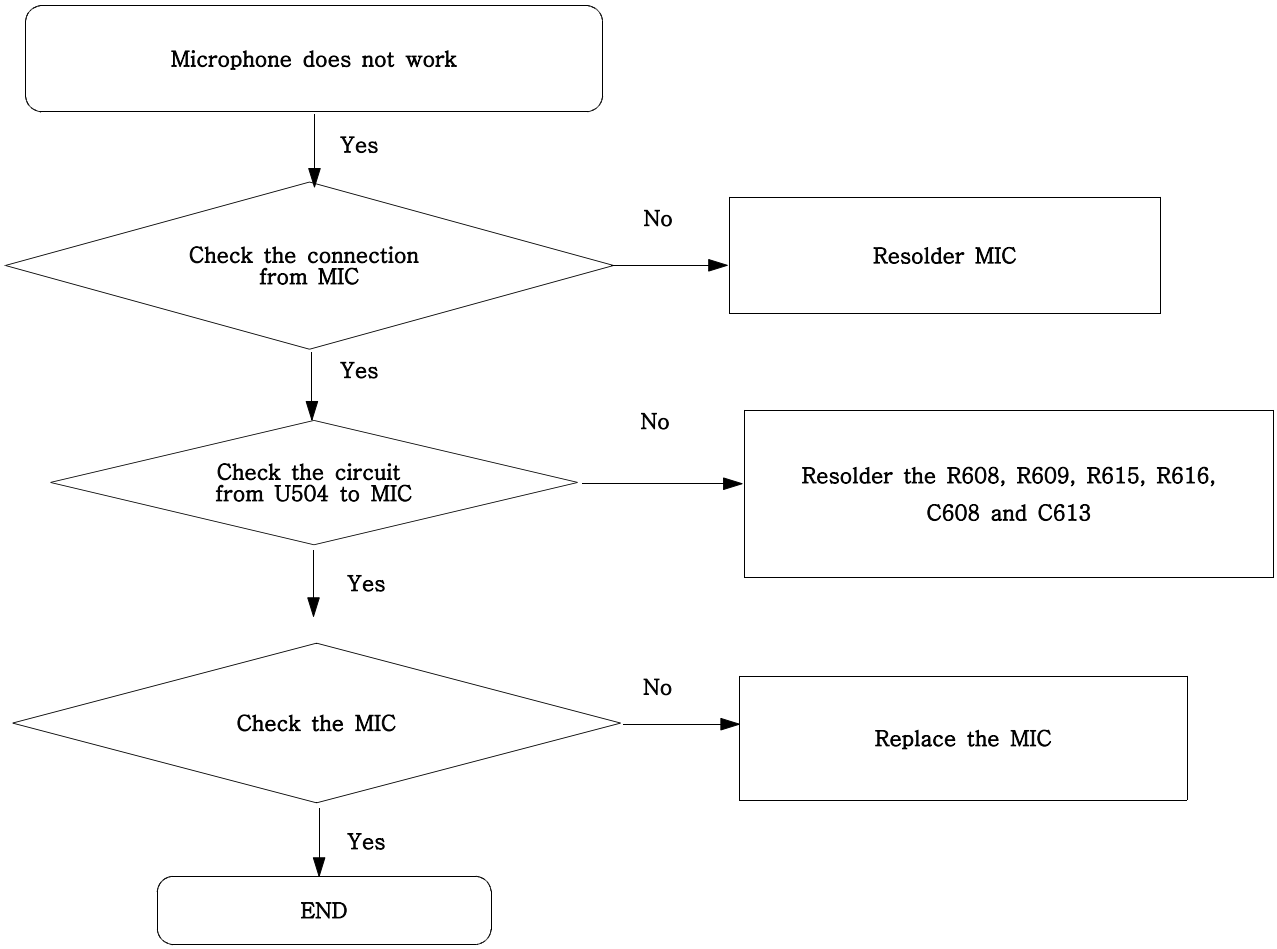
7-5. Microphone Part



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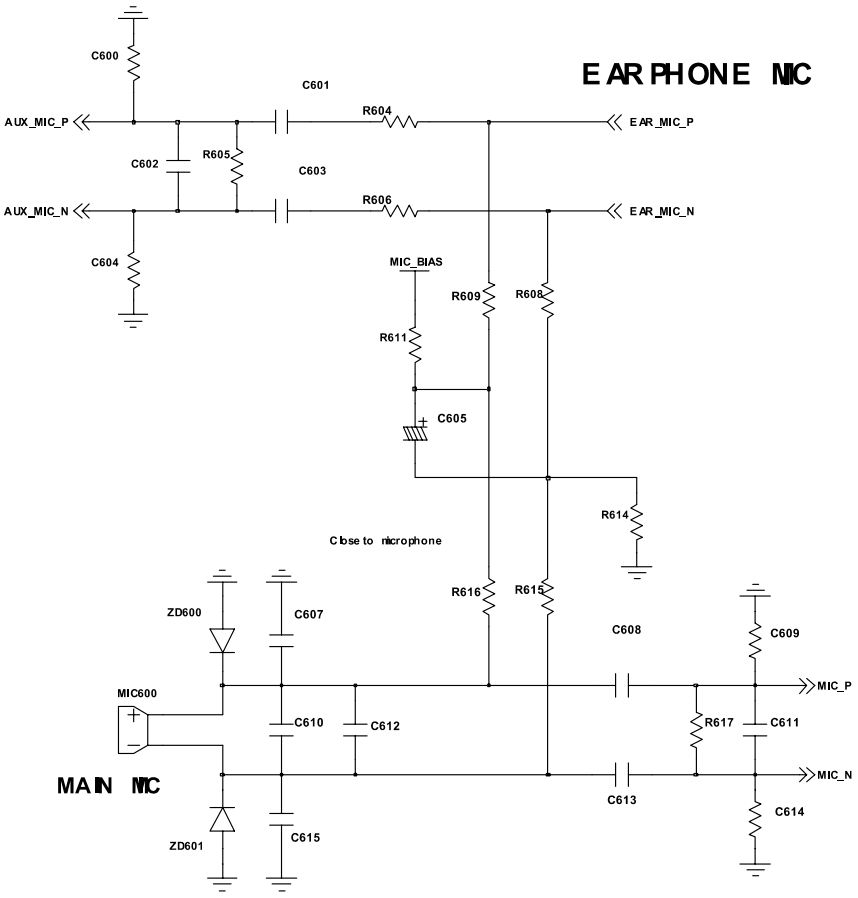
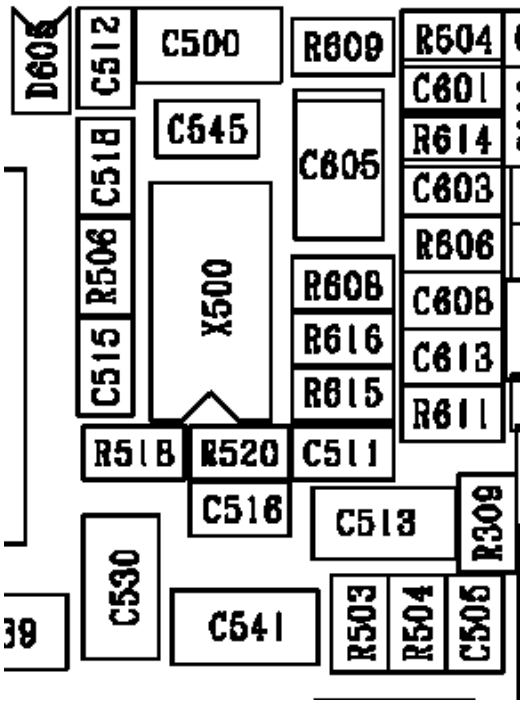
Microphone





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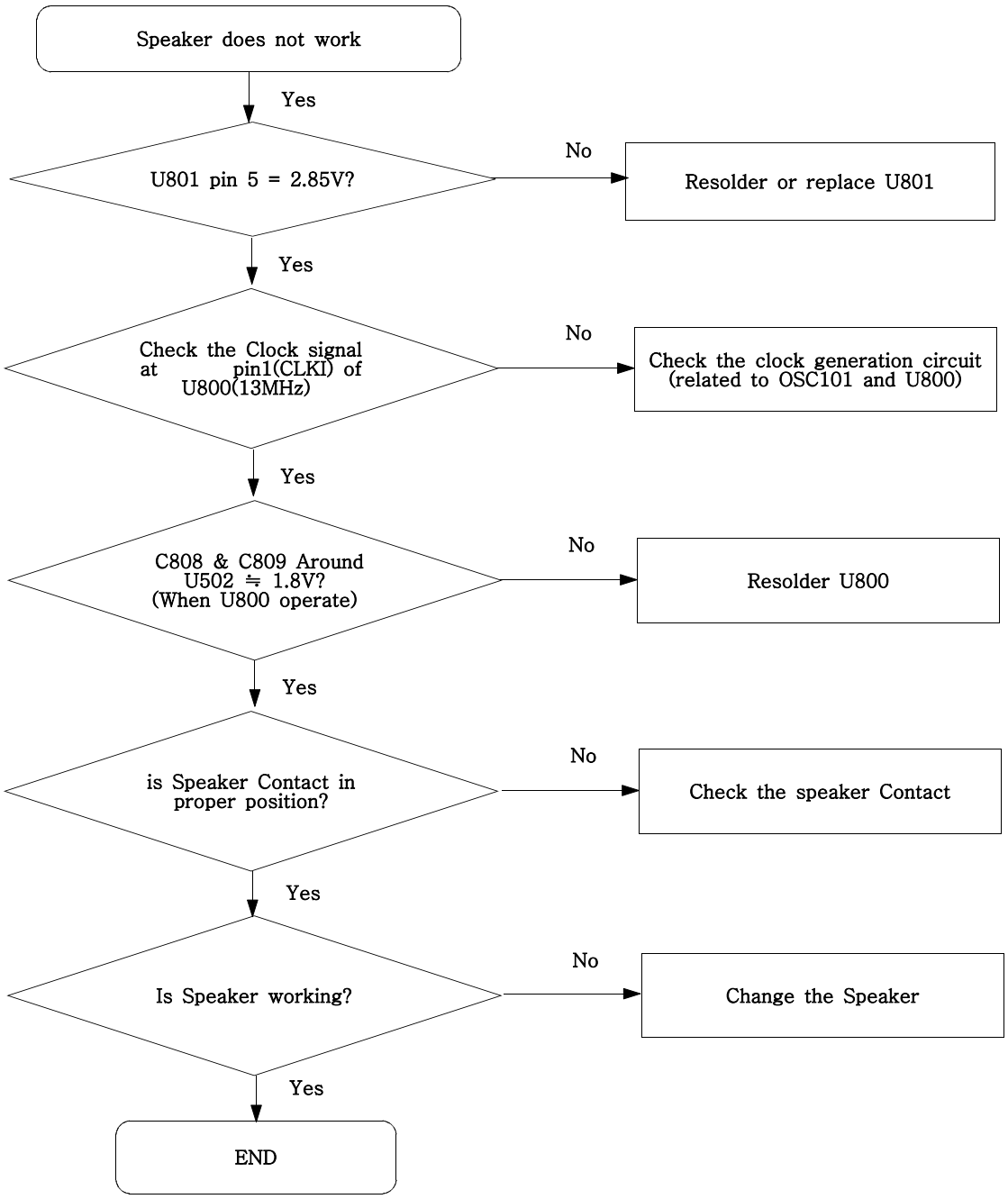
7-6. Speaker Part(Melody)



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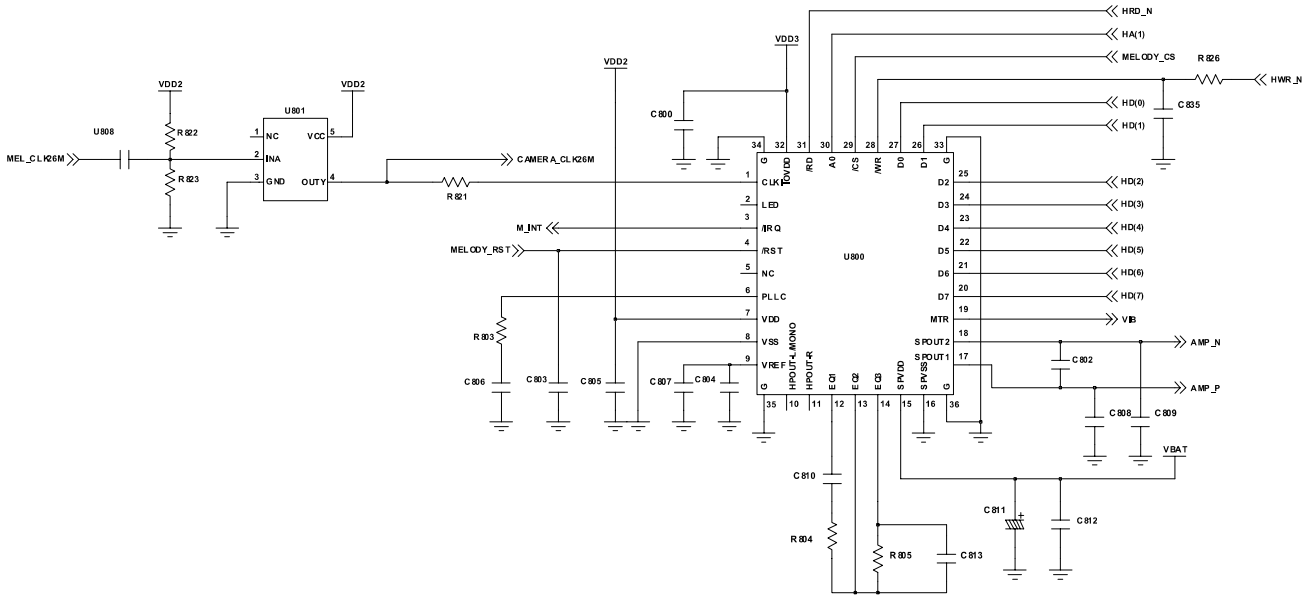
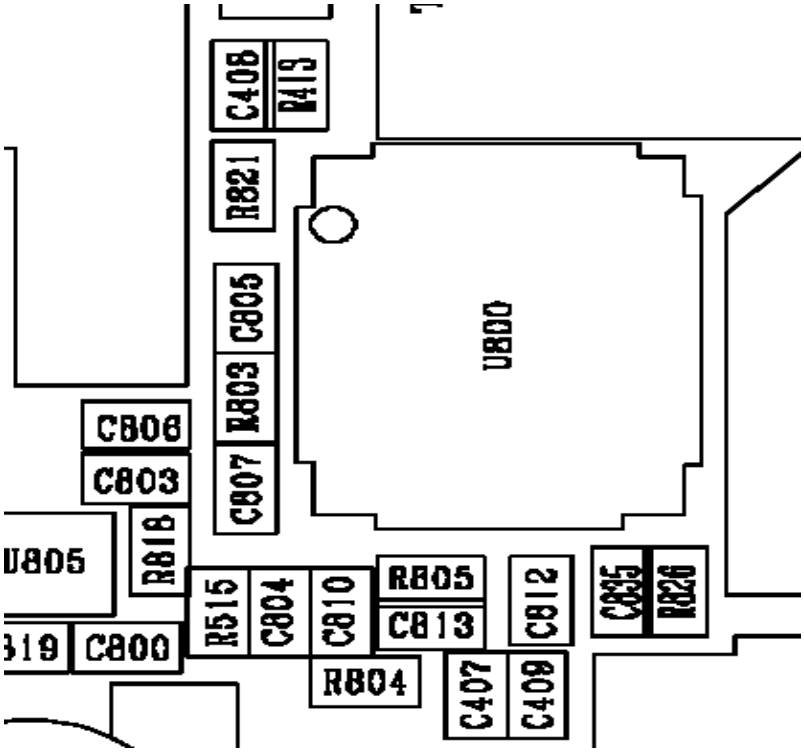
Speaker





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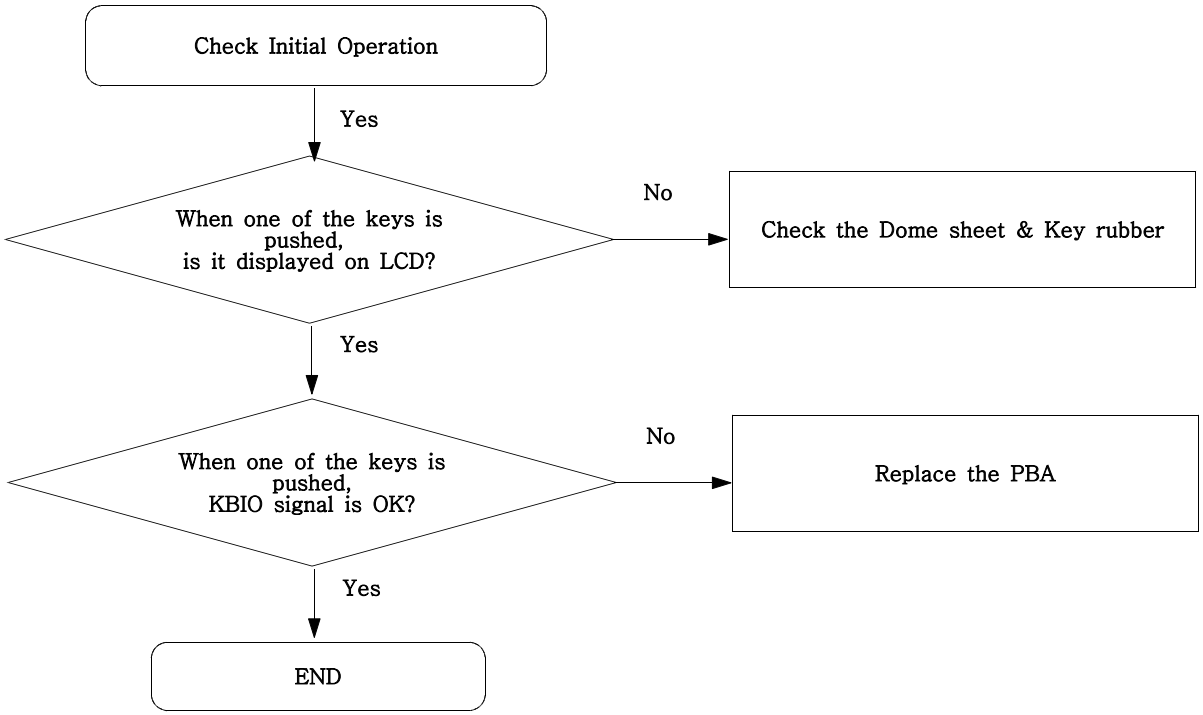
7-7. Key Data Input



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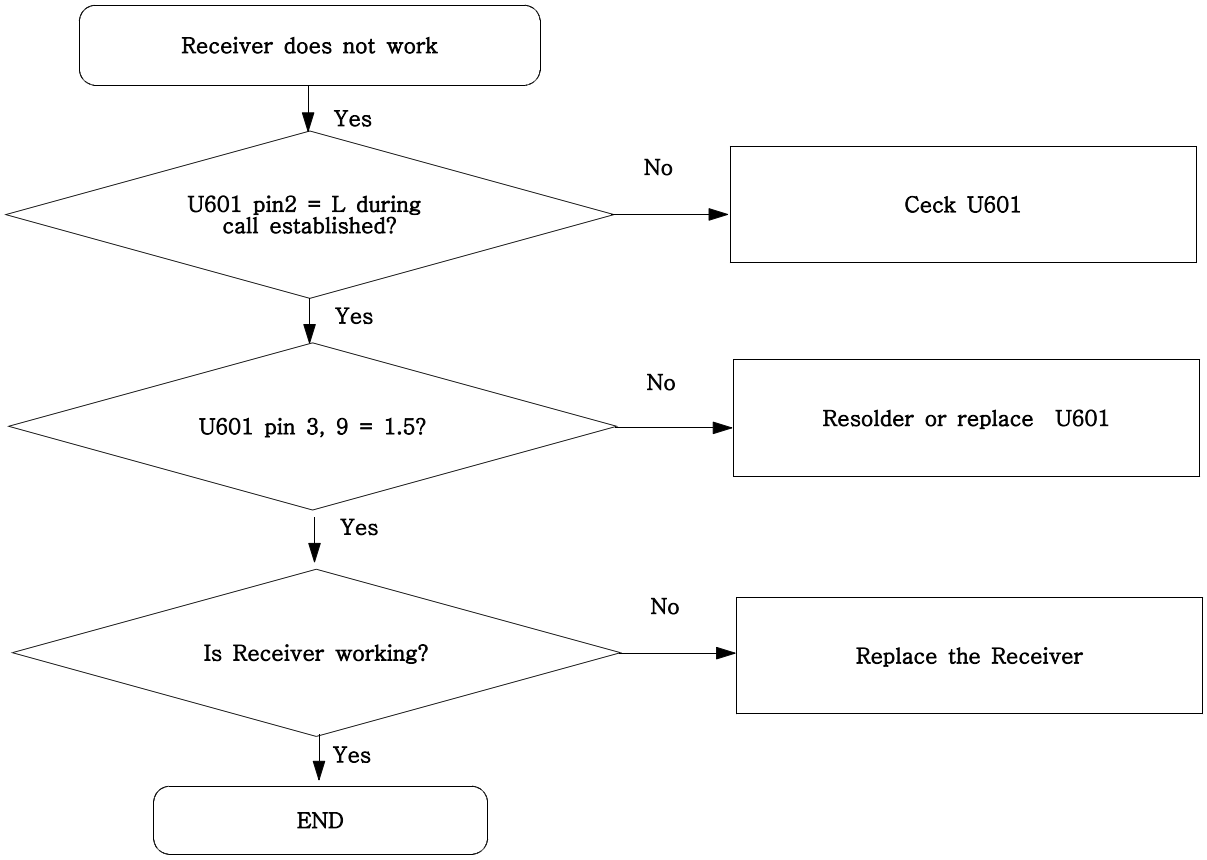
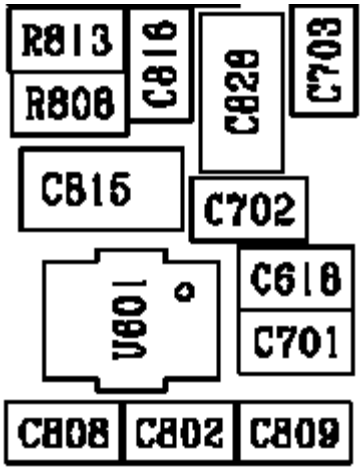
7-8. Receiver Part





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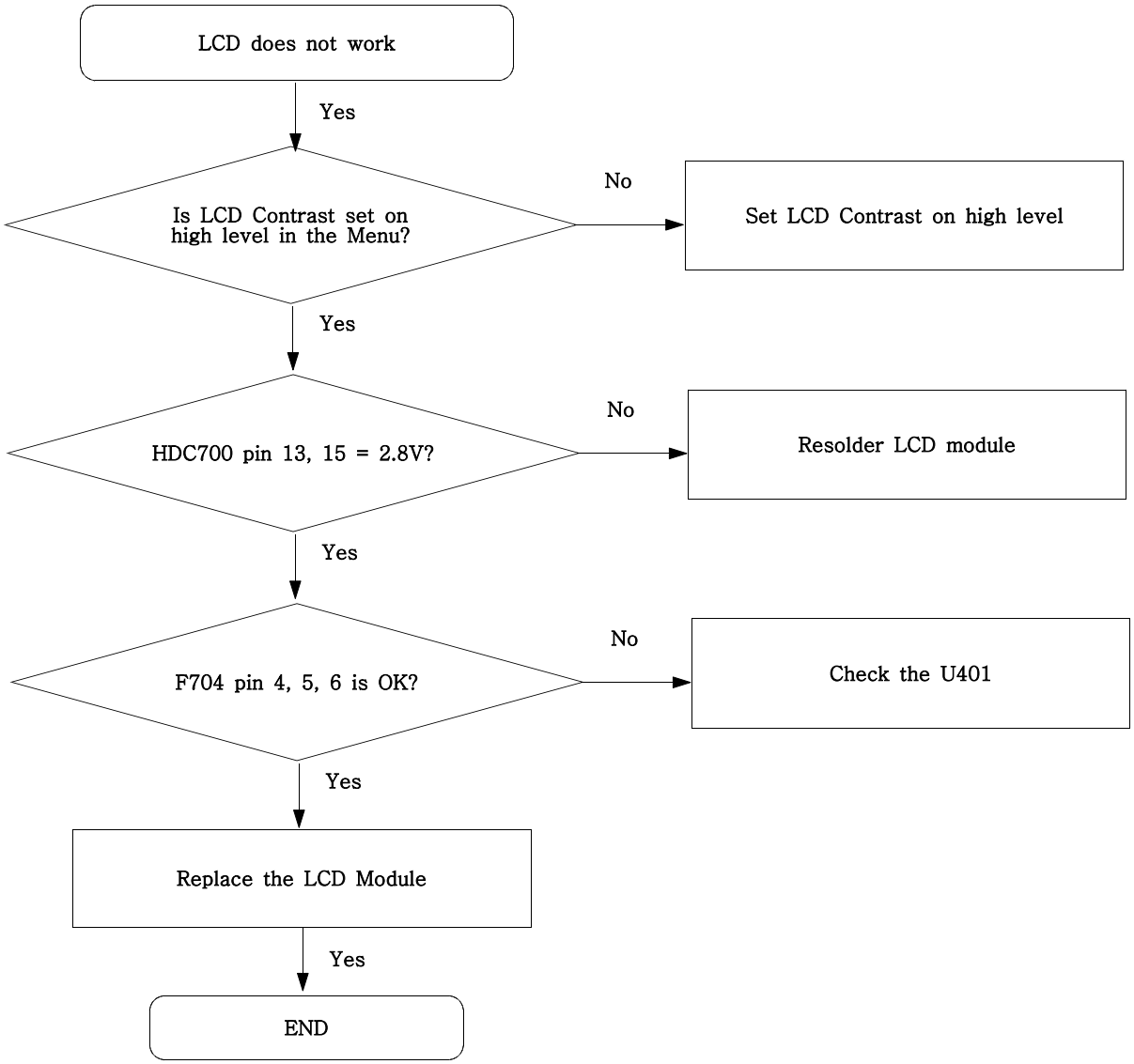
7-9. LCD Part (for Color Main)



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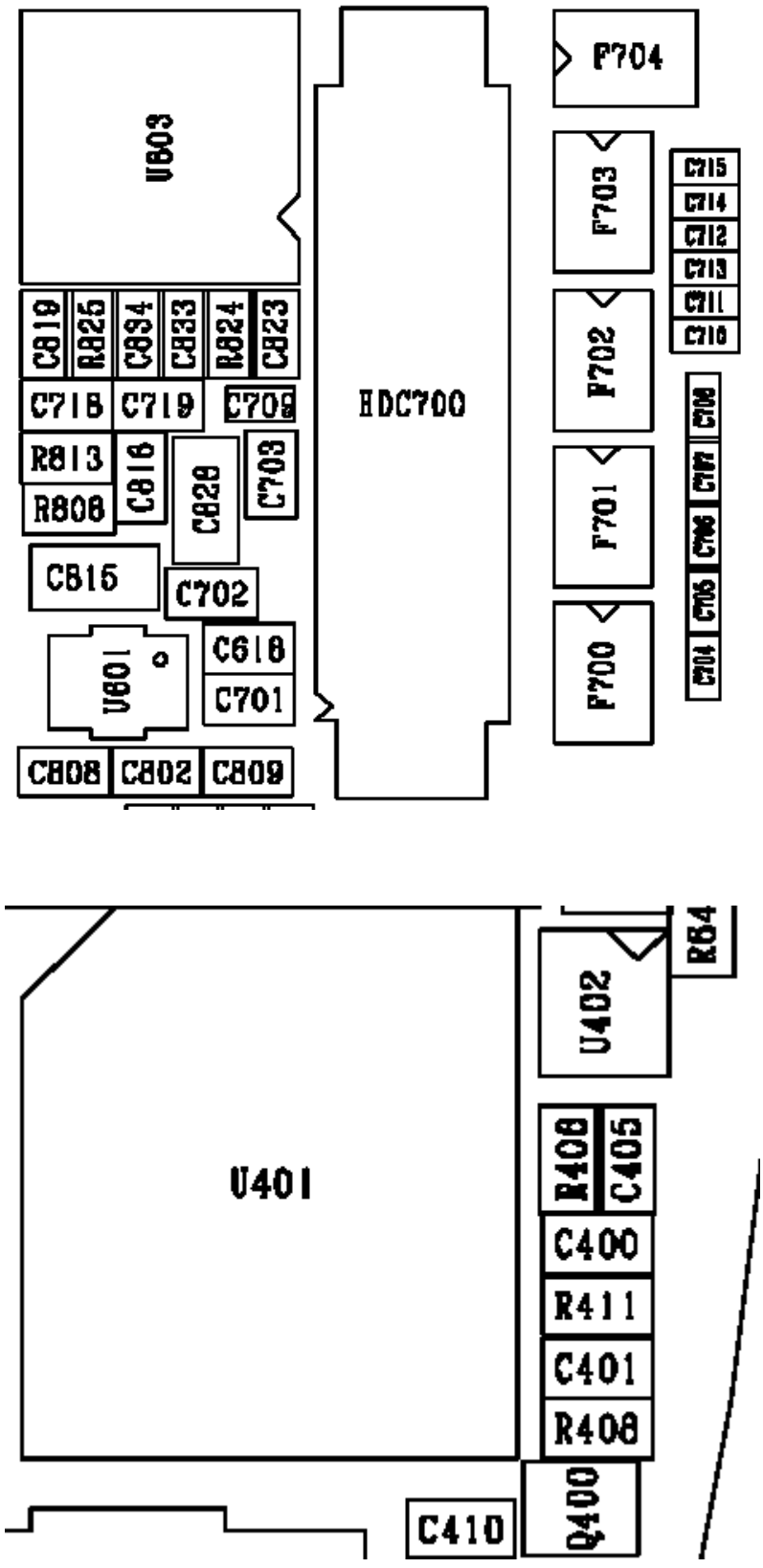

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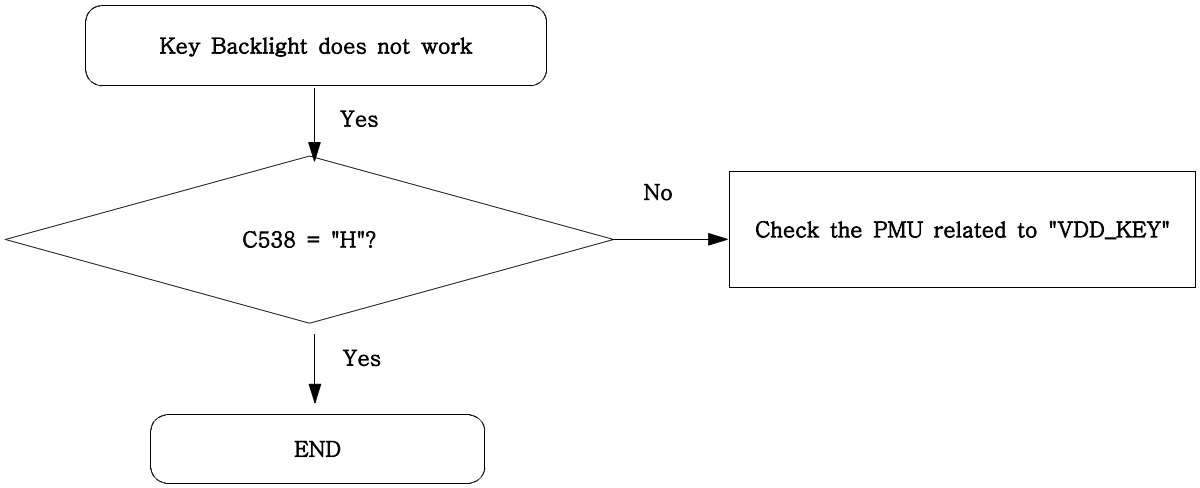
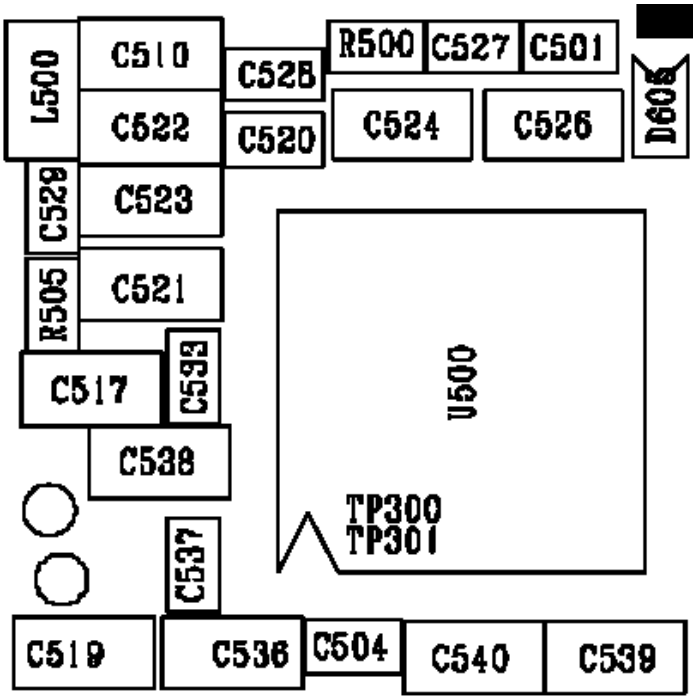
7-10. Key Back Light





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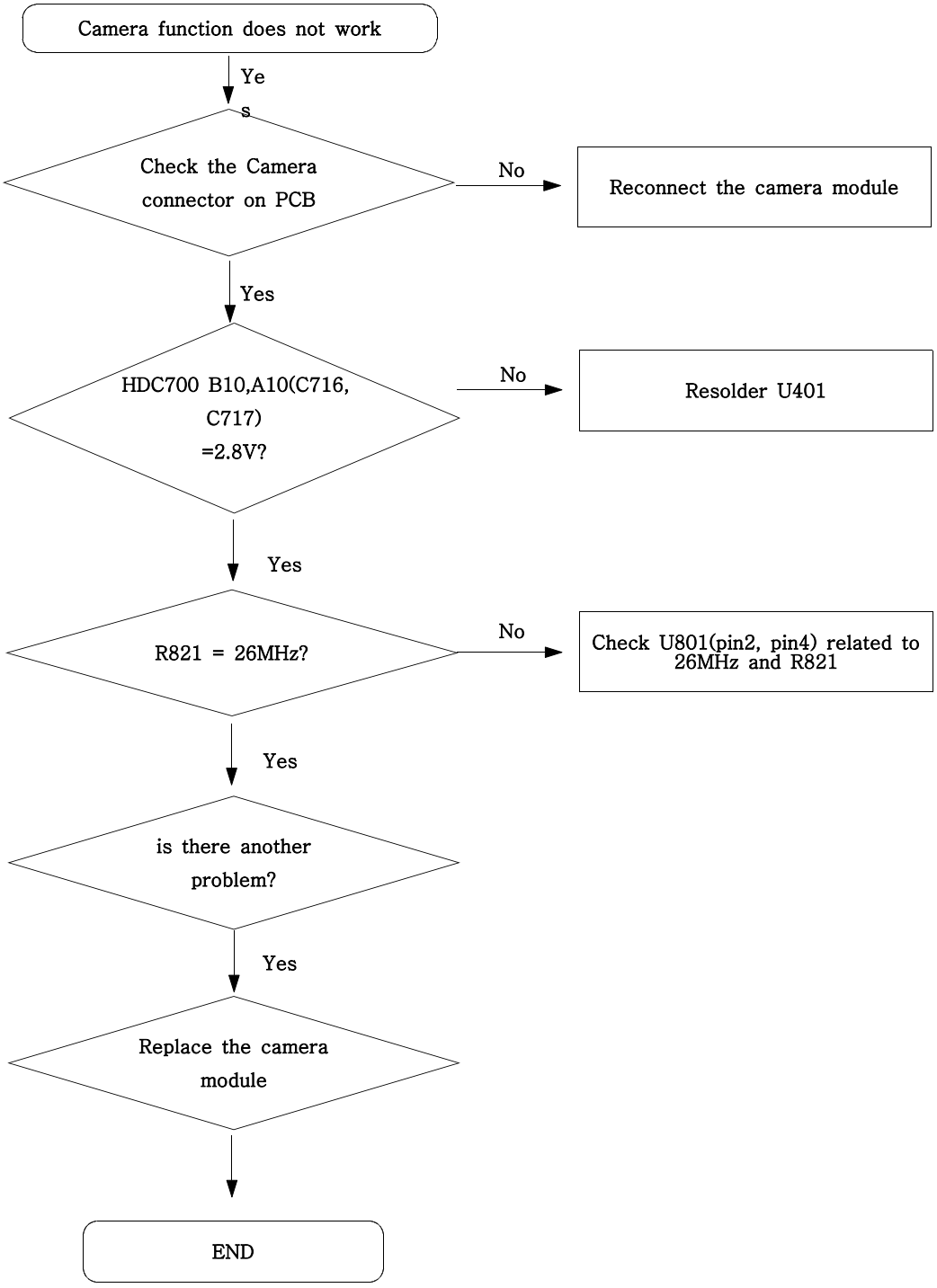
7-11. Camera part



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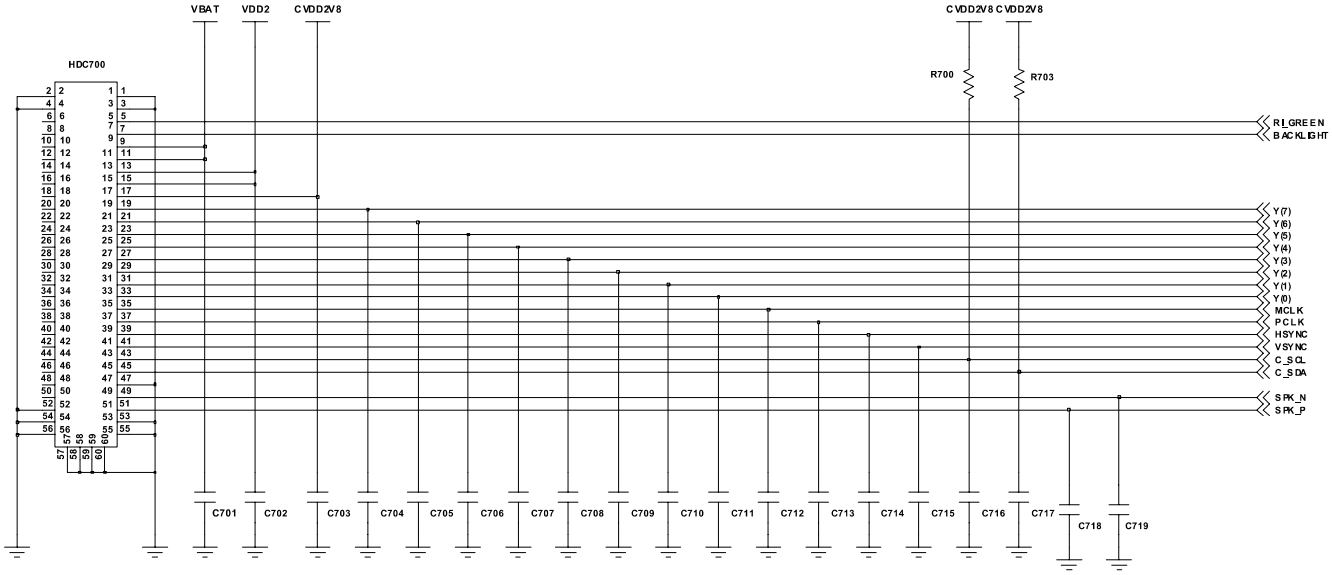

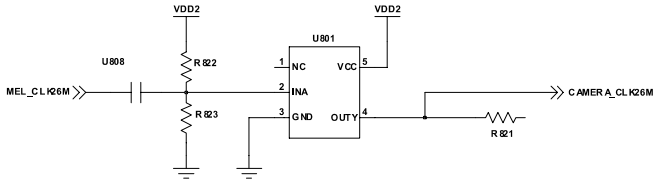

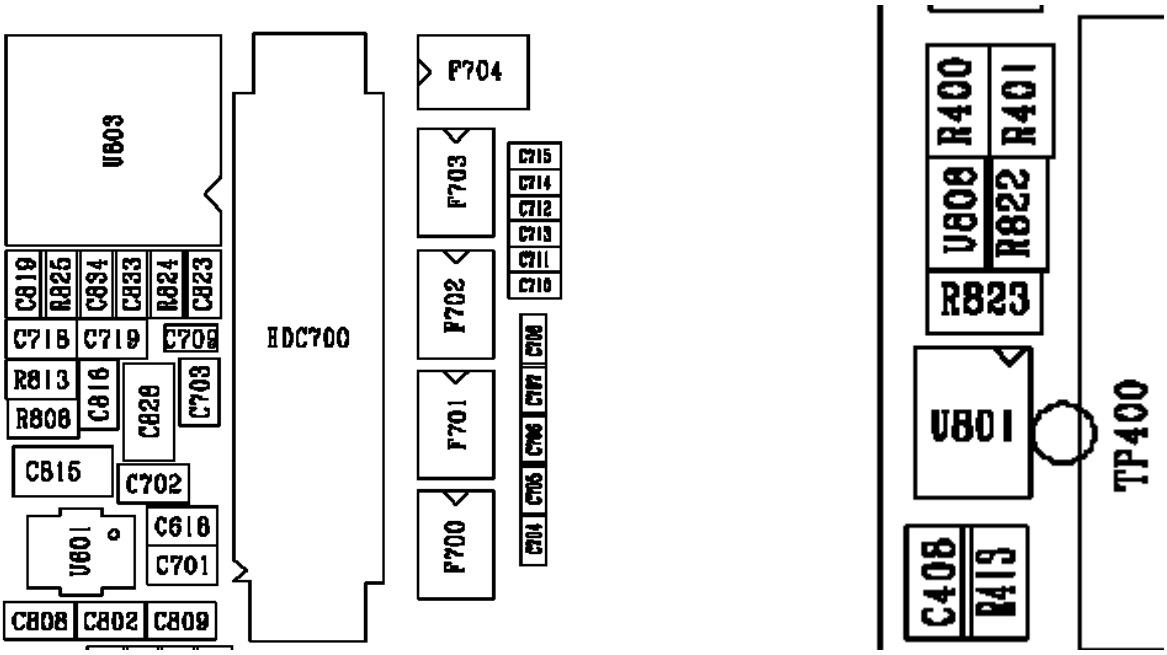

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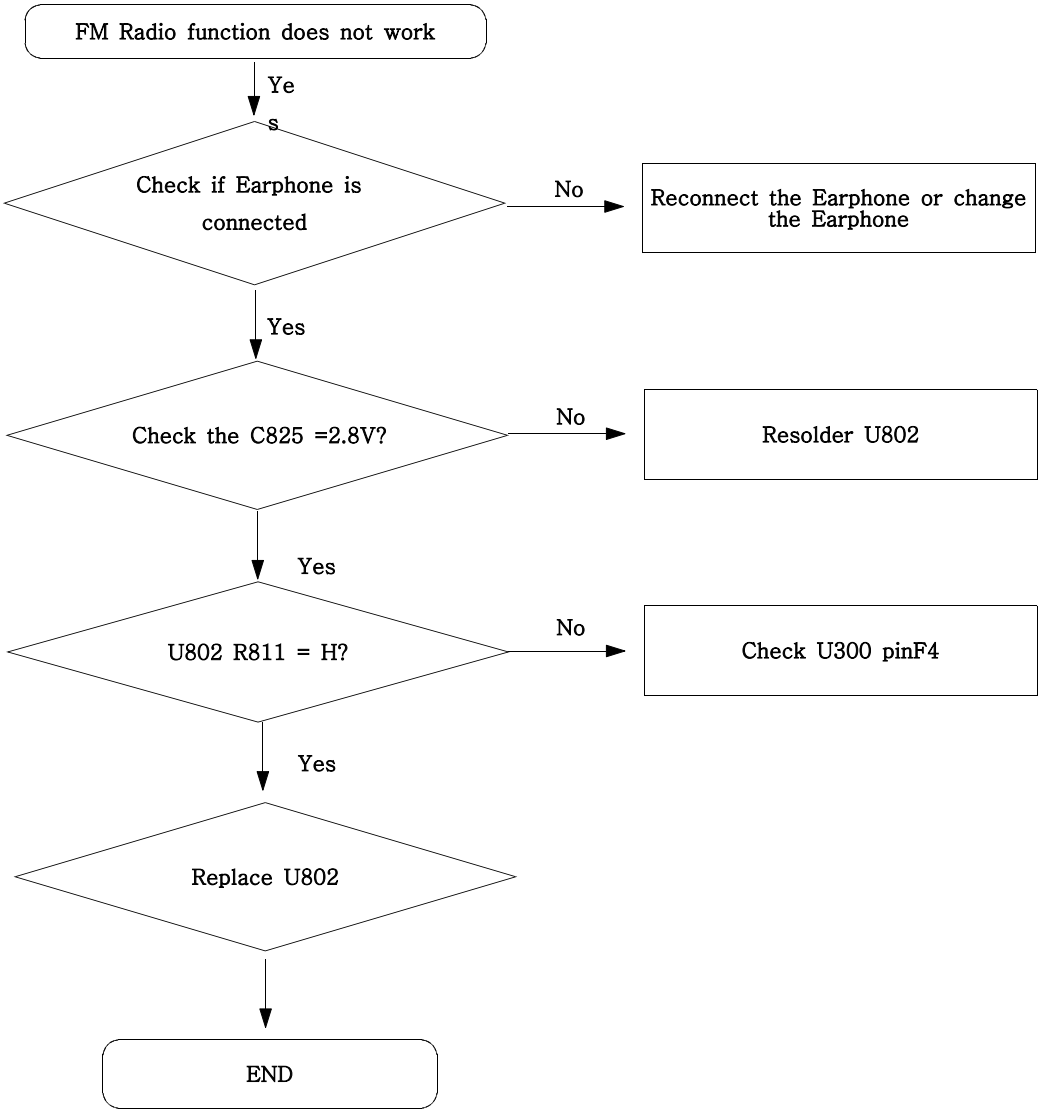
7-12. FM Radio part



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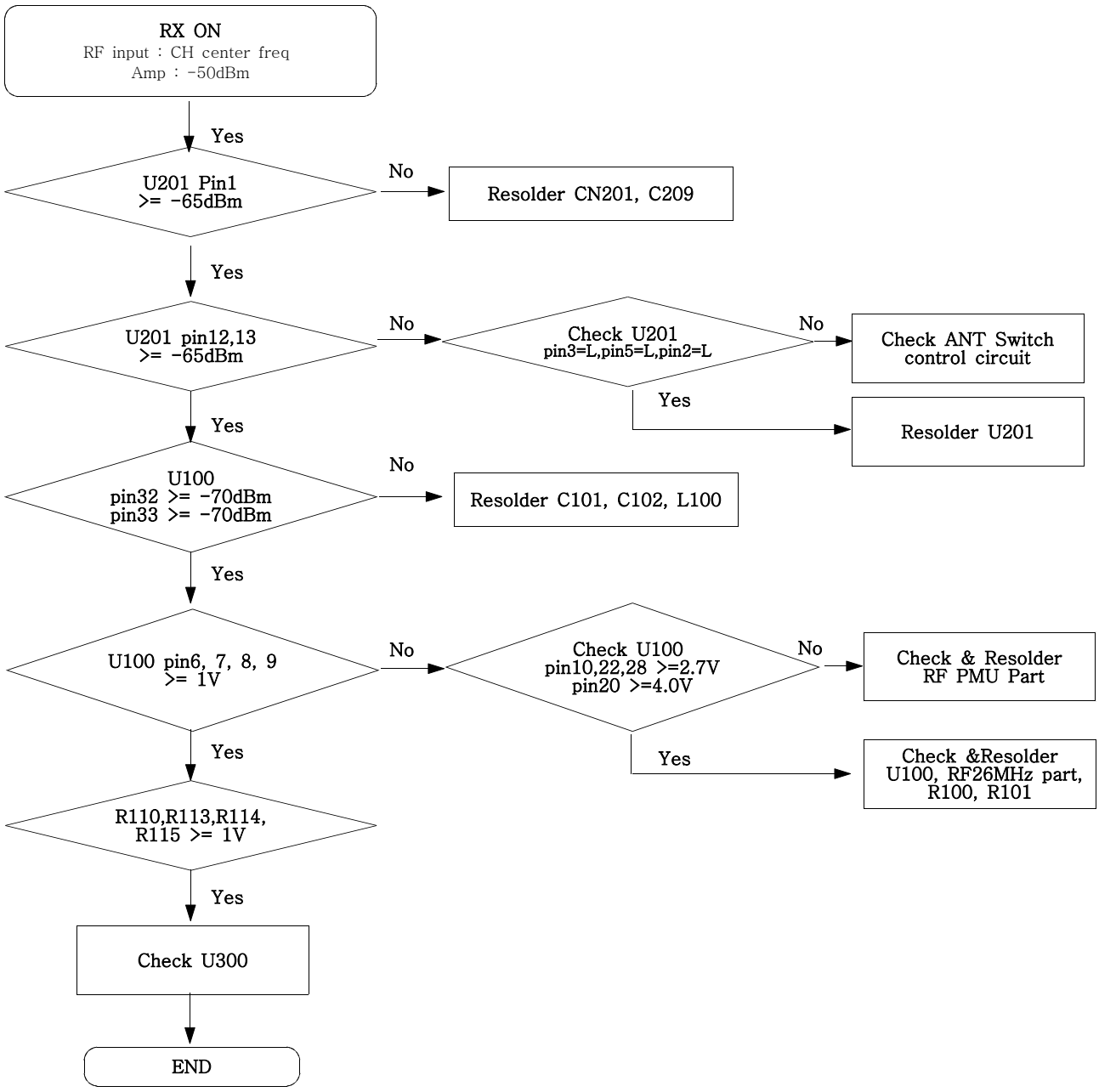
7-13. GSM Receiver



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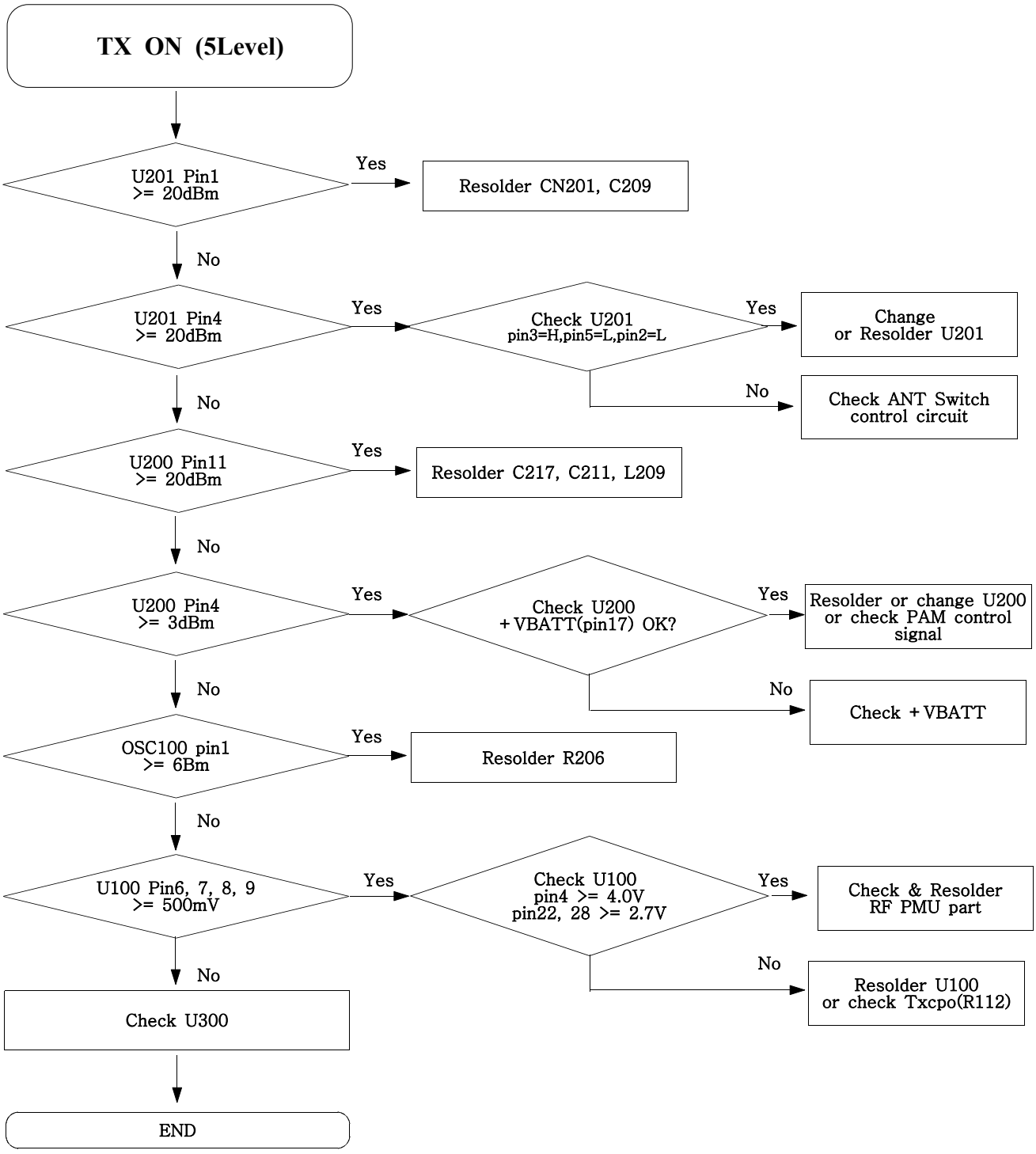
7-14. GSM Transmitter



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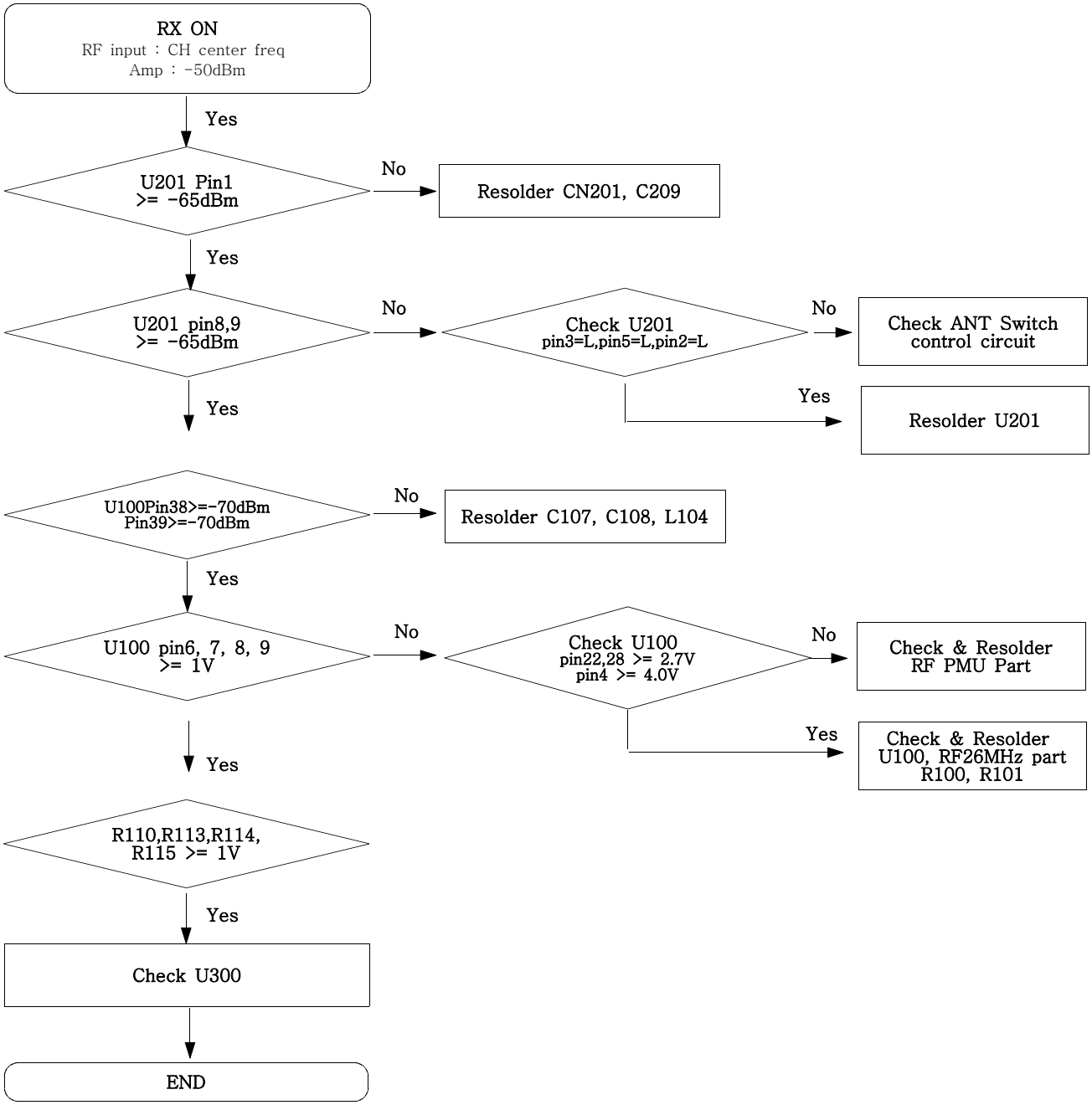
7-15. DCS Receiver



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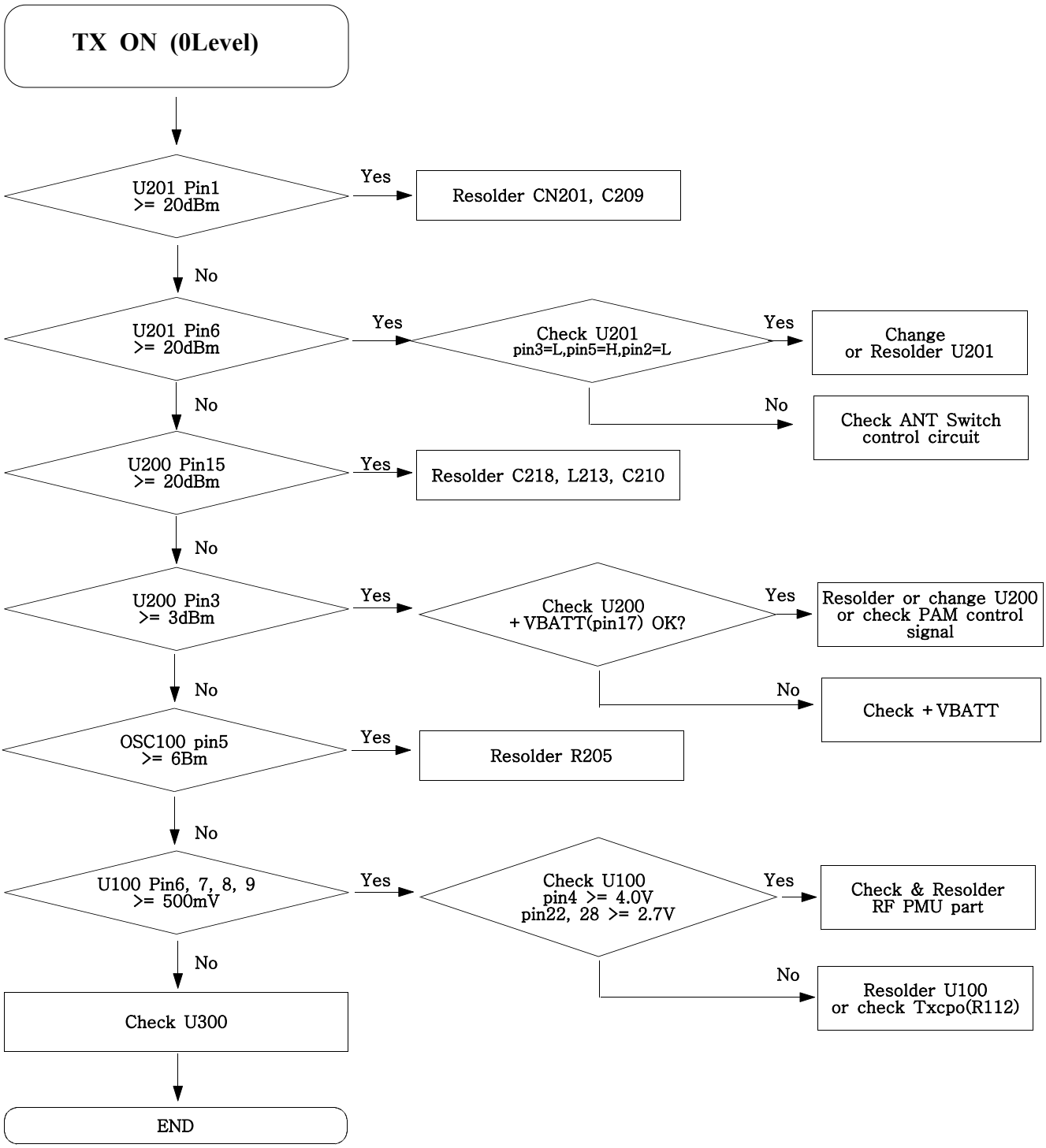
7-16. DCS Transmitter



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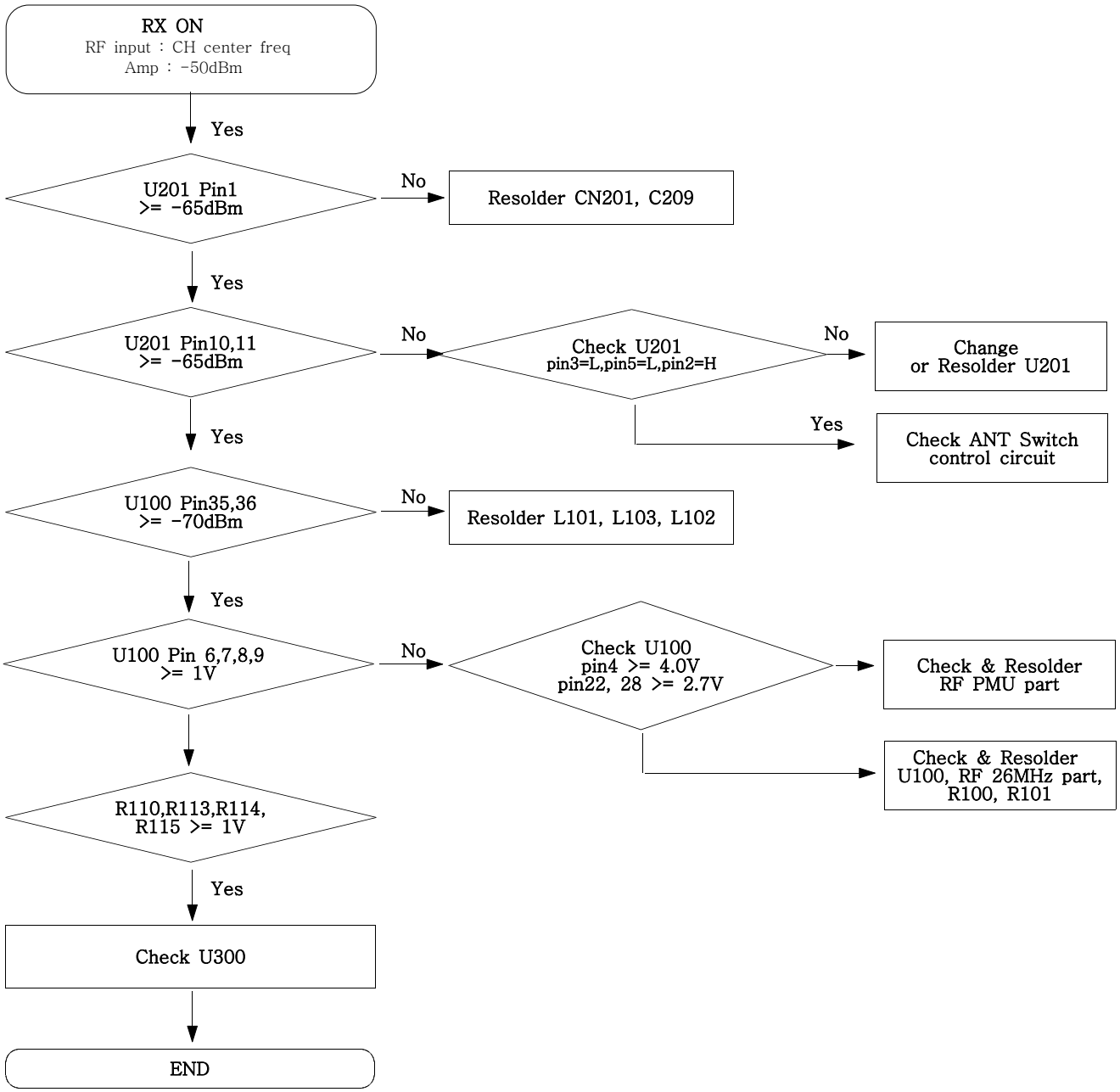
7-17. PCS Receiver



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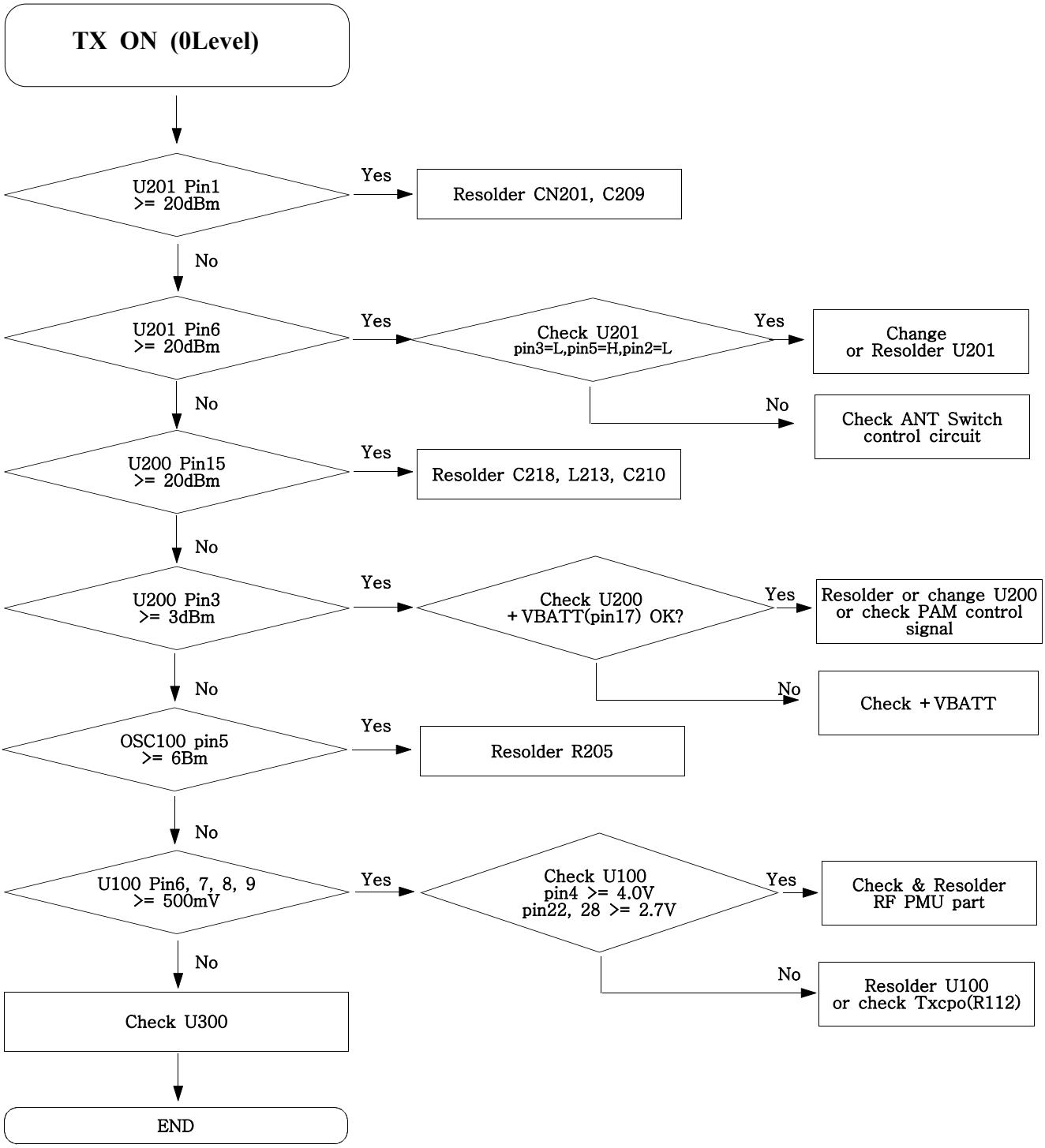
7-18. PCS Transmitter



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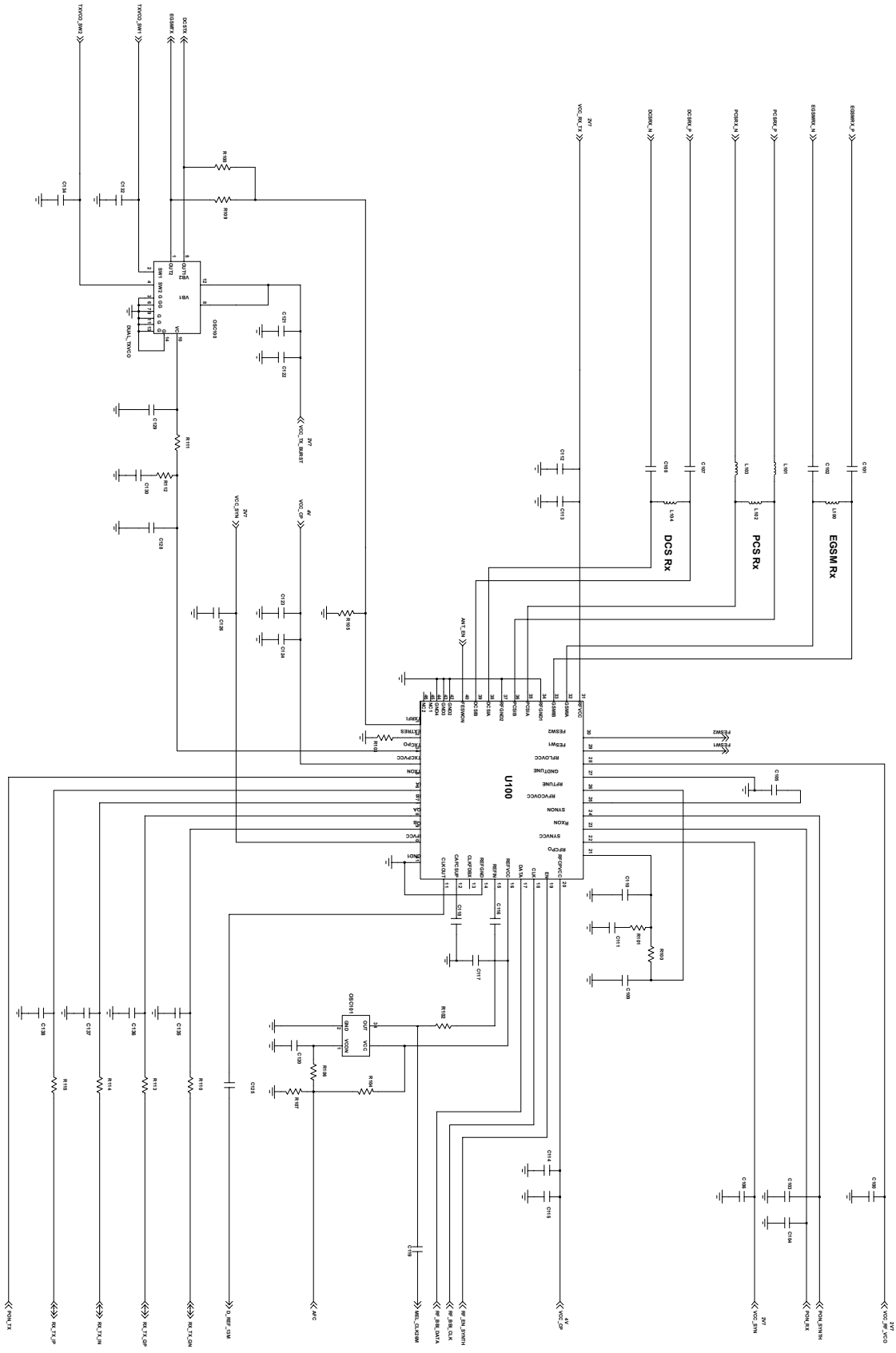

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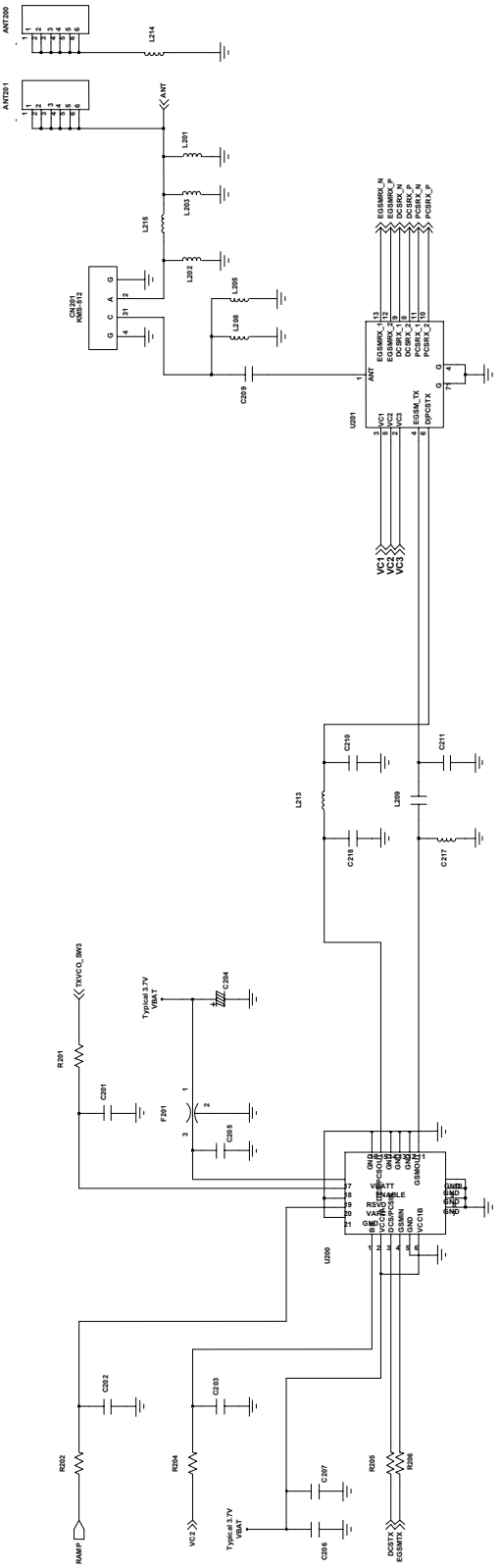

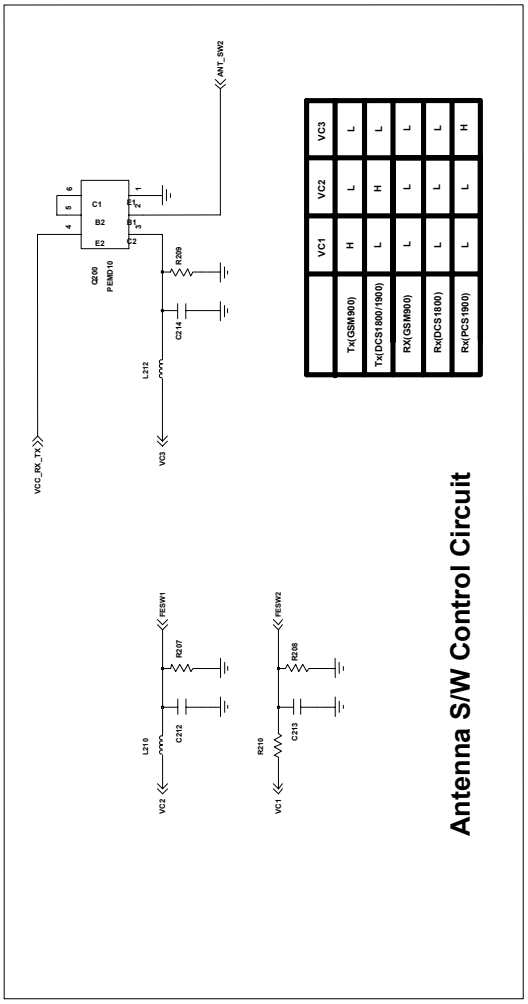

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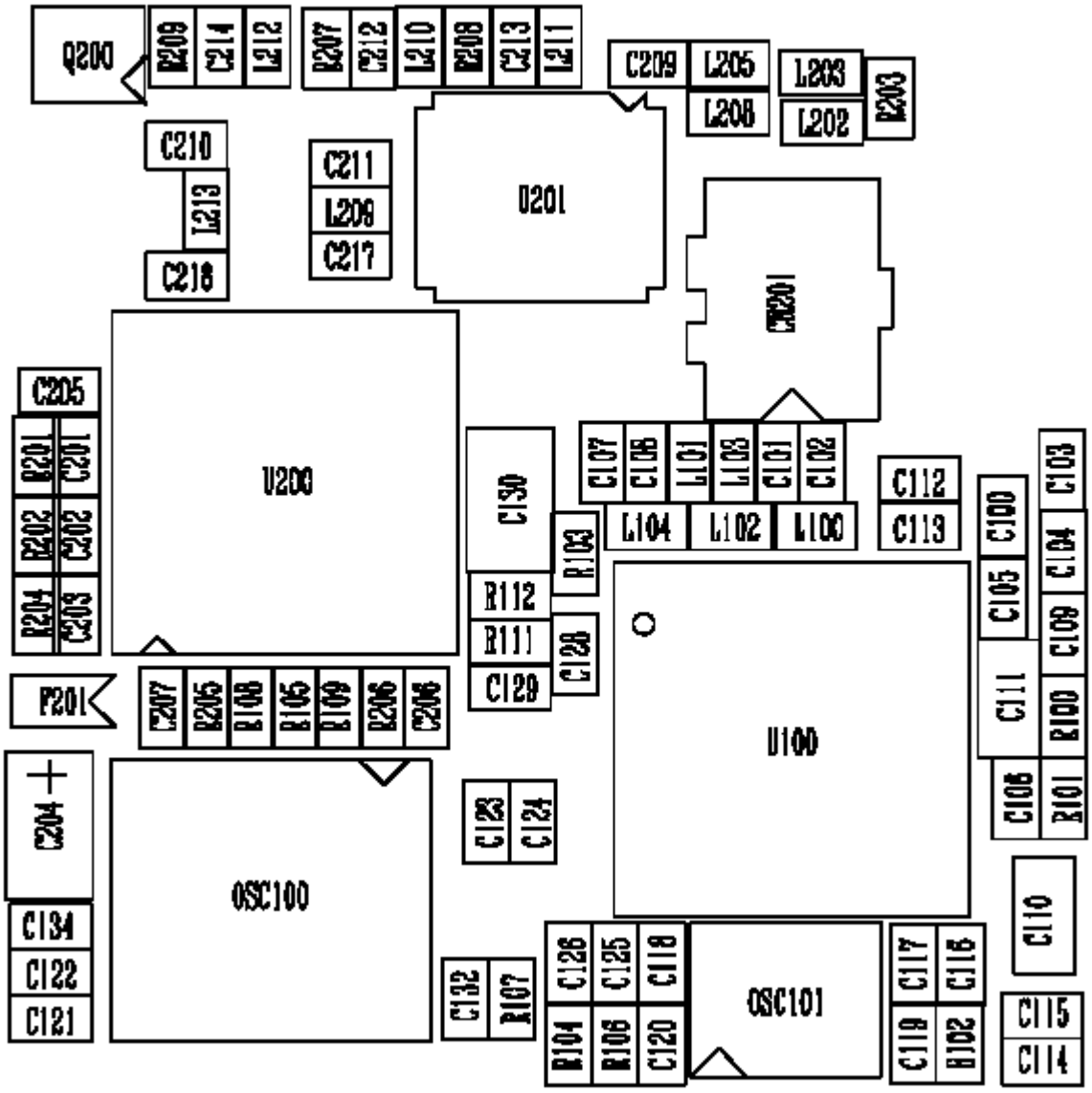

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8. Disassembly and Assembly instructions

8-1. Disassembly

1

1) Unscrew the REAR at the four points.
2) Disassemble the IF COVER
3) Disassemble the EAR COVER

1) Be careful not to make scratch and molding damage!

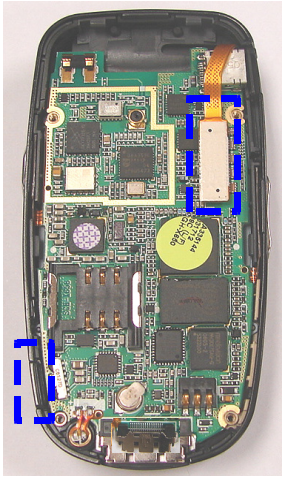
2

1) Disassemble the Rear from the bottom side to the upper side.

1) Be careful not to make scratch and molding damage!

3

1) Disassemble the LCD CONNECTOR/IRDA WINDOW
2) Disassemble the PBA from the FRONT ASS'Y
3) Remove the FRONT TAPE
4) Disassemble the Keypad.



1) When PBA is separated from LCD Connector, Be careful not to damage!
2) Be careful not to damage LCD FPCB!

4

1) Push the hinge between Folder Upper and lower, And Disassemble Front from Folder.

1) Be careful not to make scratch and molding damage!
2) Be careful not to damage LCD FPCB!

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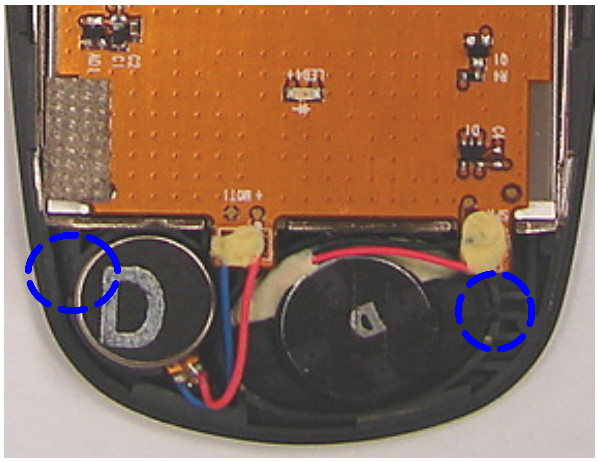
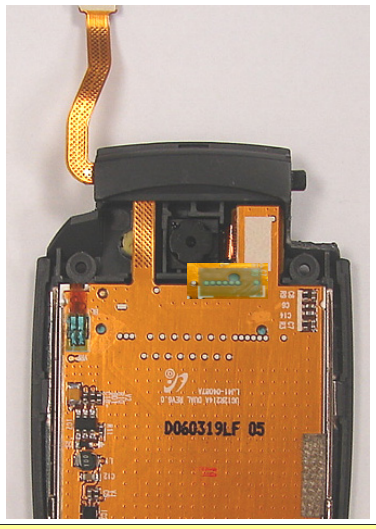
5 1) Remove screw caps. 2) Unscrew the FOLDER Upper.	6 1) By using an assembly stick, Disassemble Folder Upper from Folder lower (Right and Left are the same process)
1) Be careful not to make scratch and molding damage! 2) Be careful not to damage LCD FPCB!	1) Be careful not to make scratch and molding damage!
7 1) Disassemble the MOTOR and the SPEAKER from FOLDER LOWER by using a pincette.	8 1) Disassemble the Camera module and the LCD FPCB when LCD module is disjointed.
	
1) Be careful not to make scratch and molding damage!	1) Be careful not to damage the LCD FPCB and the Camera module.

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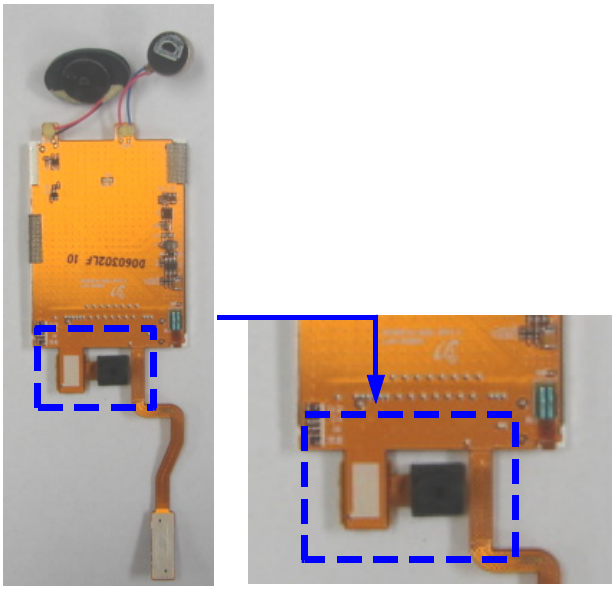
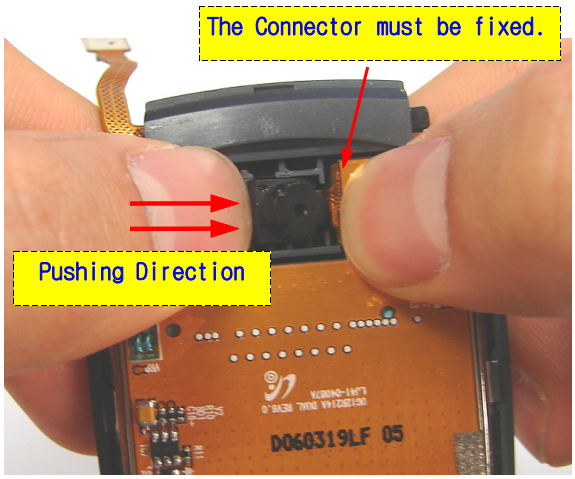
8-2. Assembly

1 1) Connect Camera module to LCD.



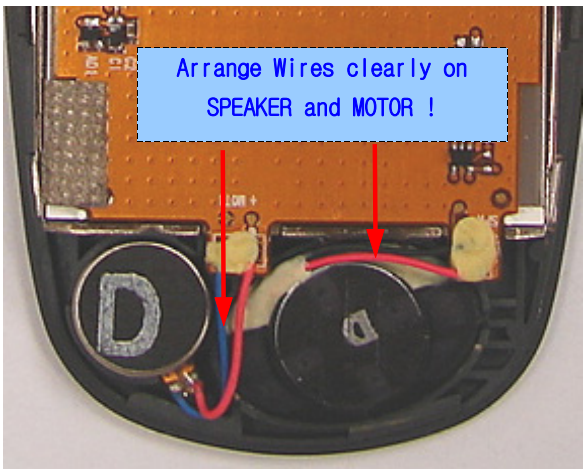
1) Be careful not to make scratch and molding damage!

2 1) Insert FPCB into FOLDER LOWER.
2) Insert Camera module[Pushing right direction as the above picture is shown] when the Connector is fixed.



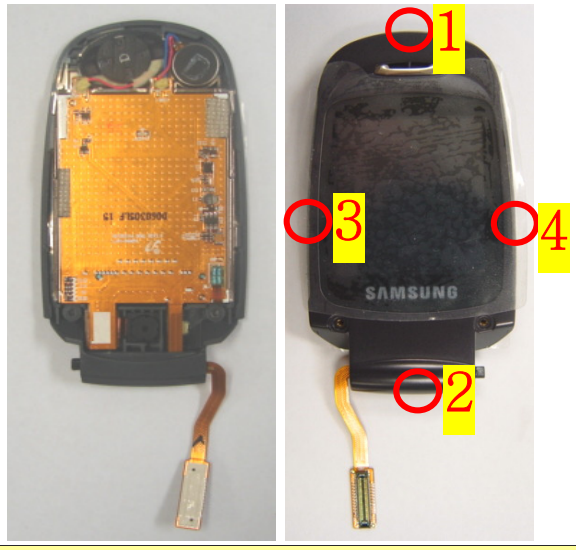
1) Be careful not to make scratch and molding damage!
2) Be careful not to damage LCD FPCB!

3 1)Insert FPCB into FOLDER LOWER.



1) When inserted FPCB, Arrange Wires clearly as above picture is shown.

4 1) Assemble FOLDER UPPER with FOLDER LOWER following the orders as above picture is shown.



1) Be careful not to make scratch and molding damage!

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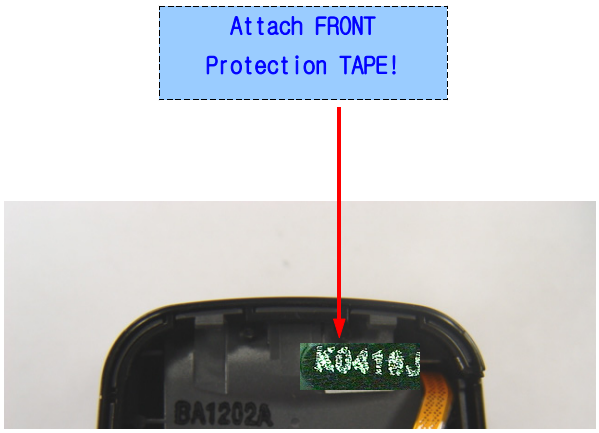
5 1) Screw up the FOLDER UPPER at the above two points.(M1.4xL4) 	6 1) Attach Screw rubber caps on the screws by using a pincette.
1) Be careful not to make scratch and molding damage! 2) Use 1.2 ± 0.2 Kgf.cm!	1) Be careful not to make scratch and molding damage!
7 1) Insert LCD FPCB[which is connected to FOLDER] into the bottom of FRONT Hinge. 2) The FOLDER's projection inserts the FRONT'S hole when Projection is pushed 3) Assemble FOLDER with FRONT 	8 1) Attach FRONT Protection TAPE as a above picture is shown. 
1) Be careful not to make scratch and molding damage!	1) Be careful not to make scratch and molding damage!

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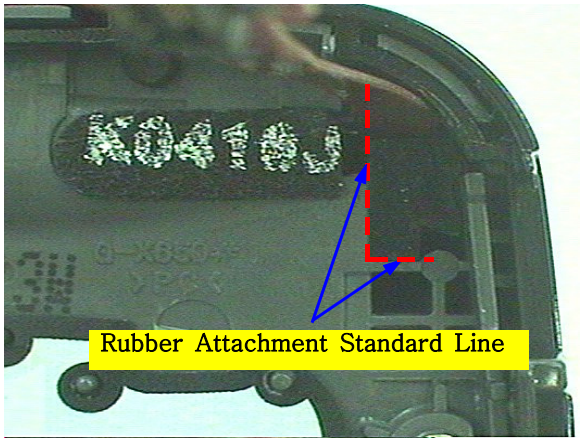
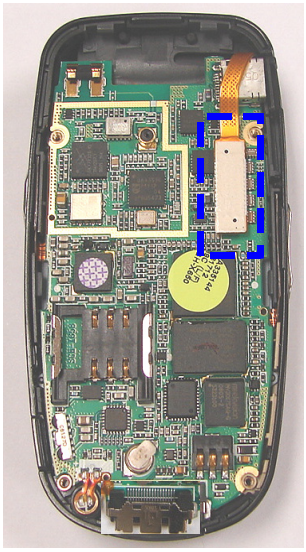
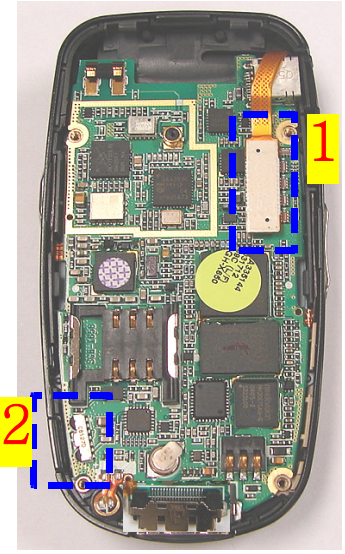
9 1) Attach the Rubber following Red Line as the above picture is shown. 	10 1) Insert the KEYPAD.
1) Be careful not to damage LCD FPCB!	1) Be careful not to insert keypad into FRONT incorrectly![Put KEYPAD Holes into FRONT Projection correctly!]
11 1) Insert PBA into FRONT. 2) Connect LCD FPCB to PBA CONNECTOR. 	12 1) Insert EAR COVER at Above 1 Point. 2) Insert IRDA WINDOW at Above 2 Point. 
1) Be careful not to damage LCD FPCB! 2) Be careful not to damage PBA	1) Be careful not to insert PBA into FRONT incorrectly!

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13 1) Assemble the rear from 1 direction to 2 direction as the above picture is shown. 	14 1) Screw up the REAR at 4 Points. [M1.4* L4] 2) Insert IF COVER.
1) Be careful not to make scratch and molding damage! 2) Be careful not to miss EAR COVER and IRDA WINDOW when it is assembled!	1) Be careful not to make scratch and molding damage!

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